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(54) POLYMER EMULSION, AND COATING LIQUID AND RECORDING MEDIUM THEREOF

## (57)Abstract:

PROBLEM TO BE SOLVED: To provide a recording medium excellent in ink absorption, film forming property, surface luster and transparency, to provide a coating liquid for the recording medium, to provide a polymer emulsion using this coating liquid and a production method thereof, and to provide a method for effectively producing the recording medium.

SOLUTION: A polymer emulsion, used for a producing of a recording medium, is composed of at least a polymer compound (A) which is obtained by polymerizing a polyvinyl alcohol and/or a derivative of the polyvinyl alcohol in coexistence thereof, displaying a hydrophilicity in the range of temperature of a specific temperature (a heat-sensitive point) or below, and displaying a hydrophobicity in the range of the heat-sensitive point or above. The production method for the polymer emulsion, the coating liquid for the recording medium containing the emulsion, the recording medium, wherein a coated layer of one or above is formed on a supporter and at least one layer of coated layers is formed by this coating liquid, and the production method of this recording medium are provided.

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CLAIMS

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[Claim(s)]

[Claim 1] The giant-molecule emulsion characterized by containing the high molecular compound (A) in which the temperature field below fixed temperature (temperature-sensitive point) which is the giant-molecule emulsion used in record-medium manufacture, and is obtained by carrying out a polymerization under coexistence of polyvinyl alcohol and/or a polyvinyl alcohol derivative shows a hydrophilic property, and hydrophobicity is shown in a temperature field higher than a temperature-sensitive point.

[Claim 2] The giant-molecule emulsion according to claim 1 characterized by containing the particle formed of the core section which said giant-molecule emulsion becomes from a particle (B), and the shell section which consists of a high molecular compound (A) prepared in the perimeter of this core section.

[Claim 3] The manufacture approach of the giant-molecule emulsion which is the manufacture approach of a giant-molecule emulsion and is characterized by containing at least the process which carries out the polymerization of the high molecular compound (A) in a temperature field higher than a temperature-sensitive point.

[Claim 4] The manufacture approach of the giant-molecule emulsion which is the manufacture approach of a giant-molecule emulsion and is characterized by containing at least the process which carries out the polymerization of the high molecular compound (A) under existence of a particle (B) in a temperature field higher than a temperature-sensitive point.

[Claim 5] Coating liquid for record media characterized by containing a giant-molecule emulsion according to claim 1 or 2.

[Claim 6] Coating liquid for record media characterized by containing a giant-molecule emulsion and a particle (C) according to claim 1 or 2.

[Claim 7] Coating liquid for record media according to claim 5 or 6 characterized by producing thickening or gelation when temperature is lowered to below a temperature-sensitive point.

[Claim 8] The manufacture approach of the record medium characterized by including the process to which it is the manufacture approach of a record medium of having prepared the one or more-layer coating layer on the base material, and the formation approach of at least one layer of this coating layer cools the coating liquid of a publication to the temperature after coating and below a temperature-sensitive point on a base material in any 1 term of claims 5-7 at temperature higher than the temperature-sensitive point of a high molecular compound (A).

[Claim 9] The record medium with which at least one layer of this coating layer is characterized by being formed with the coating liquid of claims 5-7 in the record medium which prepared the one or more-layer coating layer on the base material.

[Claim 10] The record medium characterized by at least one layer of this coating layer containing the high molecular compound (A) contained in a giant-molecule emulsion according to claim 1 or 2 in the record medium which prepared the one or more-layer coating layer on the base material.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the coating liquid for record media and the efficient manufacture approach of a record medium which are used for record media, such as printing performed by the approach of making an ink constituent adhering to a record medium, paper used for record, a sheet, a film, and cloth, and manufacture of those, and the manufacture approach of a giant-molecule emulsion useful to manufacture of this record medium, and this giant-molecule emulsion.

[0002]

[Description of the Prior Art] Use is advanced in the large field from that an ink jet recording method has little noise at the time of record, and colorization is easy, and high-speed record being possible. However, since ink absorptivity and drying are inferior in the paper of fine quality used for general printing and image quality, such as resolution, is also inferior, the proposal of exclusive paper which has improved these is made, and in order to raise the color enhancement of ink, and repeatability, the record form which applied various inorganic pigments including an amorphous silica is indicated (JP,55-51583,A, JP,56-148585,A, etc.).

[0003] However, improvement in the further engine performance was required also of the record-medium side with the advance of the ink jet printer engine performance, and the satisfying engine performance is no longer obtained necessarily only with the aforementioned technique. In order to obtain about the same high definition as a film photo especially, it is required to increase the ink discharge quantity per unit area to a record medium, therefore lack of the ink absorptivity of these record media and the problem of generating of a blot are mentioned, and the transparency of an ink absorption layer and the water resisting property of the printing section after printing are also further demanded for the high definition which is equal to a film photo, surface gloss, and a depth-of-shade manifestation.

[0004] The ED of the ink jet record medium for obtaining about the same high definition as a film photo in recent years progresses, and the record medium which prepared the ink absorption layer which has the minute opening formed of a non-subtlety particle on the high base material of smooth nature, such as paper covered with polyolefine and a polymer film, is marketed as what photograph image quality is pressed for. However, if it is going to secure sufficient ink absorption capacity only in this ink absorption layer on a base material without ink absorptivity, a very thick ink absorption layer 35 micrometers or more must be formed. Applying the coating liquid of one several times the thickness of this by homogeneous thickness, and maintaining the homogeneity of thickness also in a desiccation process, in order to obtain an ink absorption layer with this thickness, it is difficult to manufacture this record medium efficiently, and it poses a problem. Furthermore, it is required that water should be used as a solvent of coating liquid for earth environmental protection in recent years, a long time is taken to dry water generally as compared with an organic solvent, it becomes more remarkable [ this problem ] and the effective solution means is searched for.

[0005] The manufacture approach of the record form using the coating liquid which contains polyvinyl alcohol, boric acid, and/or borax in one of the solution means of the with a non-

subtlety particle is indicated (JP,2000-218927,A). Although this coating liquid maintains the condition of a hypoviscosity water solution in a comparatively high temperature field (about 40 degrees C or more), it is thickened in an about 15-degree C low-temperature field (it becomes gel). Moreover, also when the coating liquid which contains gelatin with a non-subtlety particle is used, the thickening nature by the same temperature change is shown. It is possible by using this property to maintain the coating layer of a thick film at homogeneity. However, this problem is remarkable, when there is a problem which takes up the minute opening formed of the non-subtlety particle when using water-soluble polymers, such as this polyvinyl alcohol and gelatin, and especially gelatin is used. Moreover, when the environmental restriction concerning water pollution is severe and it uses polyvinyl alcohol, a boric acid, and/or a borax about boron, we are anxious about the water pollution by boron in recent years. Moreover, a mitigation of the energy costs concerning compaction and desiccation of the drying time sake, In the coating liquid which contains water-soluble polymers, such as polyvinyl alcohol and gelatin, when it is going to reduce the amount of the water which should raise the solid content concentration of coating liquid and should evaporate it Problems, like it becomes difficult to carry out coating of the coating liquid to which coating liquid viscosity increases rapidly and the handling of coating liquid becomes difficult by high concentration-ization on a base material at homogeneity are generated.

[0006] Furthermore, although the manufacture approach (JP,2001-180105,A) of the record medium using the binder constituent (JP,2001-253996,A) and this high molecular compound using the high molecular compound from which a hydrophilic property and hydrophobicity change reversibly bordering on fixed temperature (temperature-sensitive point) etc. is indicated Each of these is made to thicken by heating the binder constituent thru/or coating liquid of hypoviscosity prepared in the temperature field (temperature below a temperature-sensitive point) in which this high molecular compound shows a hydrophilic property to temperature higher than a temperature-sensitive point. The coating layer obtained by using this binder constituent thru/or this coating liquid has low transparency, surface smooth nature and surface gloss are low, for example, an ink jet record medium with which about the same high definition as a film photo is obtained cannot be obtained.

[0007] That is, development of the coating liquid for record media and the efficient manufacture approach of a record medium which are used for the ink jet record medium which may fully be satisfied from standpoints, such as high definition, earth environmental preservation, and energy saving, and its manufacture, and the manufacture approach of a giant-molecule emulsion useful to manufacture of this record medium and this giant-molecule emulsion is called for. Furthermore, it also sets to the record medium used for record by writing materials, such as thermal recording which prints by making an ink constituent color with heating, gravure, printing by other offset-printing and various methods, and a pen, etc. The record medium which may fully be satisfied from standpoints, such as surface gloss, surface glossiness, high definition, earth environmental preservation, and energy saving, Development of the coating liquid for record media used for the manufacture, the efficient manufacture approach of a record medium, and the manufacture approach of a giant-molecule emulsion useful to manufacture of this record medium and this giant-molecule emulsion is called for.

[0008]

[Problem(s) to be Solved by the Invention] This invention aims at offering the giant-molecule emulsion used for the record medium excellent in ink absorptivity, membrane formation nature, surface gloss, and transparency, the coating liquid for record media, and this coating liquid, its manufacture approach, and the efficient manufacture approach of a record medium further.

[0009]

[Means for Solving the Problem] In order that this invention person etc. may solve said technical problem, as a result of examining many things, under coexistence of polyvinyl alcohol and/or a polyvinyl alcohol derivative, carry out a polymerization and are obtained. The giant-molecule emulsion characterized by containing at least the high molecular compound (A) in which the temperature field below fixed temperature (temperature-sensitive point) shows a hydrophilic property, and hydrophobicity is shown in a temperature field higher than a temperature-sensitive point, It came to make a header and this invention also for the manufacture approach of the

record medium characterized by forming at least one-layer coating layer with the manufacture approach of this giant-molecule emulsion, the coating liquid for record media characterized by containing this emulsion, and this coating liquid, and this record medium. That is, this invention is as follows.

[0010] 1) The giant-molecule emulsion characterized by containing the high molecular compound (A) in which the temperature field below fixed temperature (temperature-sensitive point) which is the giant-molecule emulsion used in record-medium manufacture, and is obtained by carrying out a polymerization under coexistence of polyvinyl alcohol and/or a polyvinyl alcohol derivative shows a hydrophilic property, and hydrophobicity is shown in a temperature field higher than a temperature-sensitive point.

2) The giant-molecule emulsion of invention of 1 characterized by containing the particle formed of the core section which a giant-molecule emulsion becomes from a particle (B), and the shell section which consists of a high molecular compound (A) prepared in the perimeter of this core section.

3) The manufacture approach of the giant-molecule emulsion which is the manufacture approach of a giant-molecule emulsion and is characterized by containing at least the process which carries out the polymerization of the high molecular compound (A) in a temperature field higher than a temperature-sensitive point.

4) The manufacture approach of the giant-molecule emulsion which is the manufacture approach of a giant-molecule emulsion and is characterized by containing at least the process which carries out the polymerization of the high molecular compound (A) under existence of a particle (B) in a temperature field higher than a temperature-sensitive point.

[0011] 5) Coating liquid for record media characterized by containing 1 or the giant-molecule emulsion of invention of two.

6) Coating liquid for record media characterized by containing 1, or the giant-molecule emulsion and particle (C) of invention of two.

7) 5 characterized by producing thickening or gelation when temperature is lowered to below a temperature-sensitive point, or coating liquid for record media of invention of six.

8) The manufacture approach of the record medium characterized by including the process to which it is the manufacture approach of a record medium of having prepared the one or more-layer coating layer on the base material, and the formation approach of at least one layer of this coating layer cools the coating liquid of invention of either 5-7 to the temperature after coating and below a temperature-sensitive point on a base material at temperature higher than the temperature-sensitive point of a high molecular compound (A).

9) The record medium characterized by forming at least one layer of this coating layer with the coating liquid of invention of 5-7 in the record medium which prepared the one or more-layer coating layer on the base material.

10) The record medium characterized by at least one layer of this coating layer containing the high molecular compound (A) contained in 1 or the giant-molecule emulsion of invention of two in the record medium which prepared the one or more-layer coating layer on the base material.

[0012]

[Embodiment of the Invention] This invention is explained concretely below. Under coexistence of the polyvinyl alcohol and/or the polyvinyl alcohol derivative which are used for this invention, carry out a polymerization and are obtained. The high molecular compound (A) in which the temperature field below fixed temperature (temperature-sensitive point) shows a hydrophilic property, and hydrophobicity is shown in a temperature field higher than a temperature-sensitive point The high molecular compound obtained by carrying out the polymerization of one sort of the monomer (the main monomer (M)) from which the high molecular compound which presents this temperature responsibility (hydrophilic property - hydrophobic change) by homopolymerizing is obtained, or the two sorts or more under coexistence of polyvinyl alcohol and/or a polyvinyl alcohol derivative, or It can react with this main monomer (M), and a high molecular compound can be made. According to and homopolymerization It is the high molecular compound obtained by carrying out the polymerization of the monomer (submonomer (N)) and the main monomer (M) from which the high molecular compound which presents \*\*\*\* temperature responsibility is not

obtained under coexistence of polyvinyl alcohol and/or a polyvinyl alcohol derivative. The main monomer (M), a submonomer (N), polyvinyl alcohol, and a polyvinyl alcohol derivative can also be respectively used combining one sort or two sorts or more of things.

[0013] By using a submonomer (N) for a copolymerization component, it becomes possible to obtain the high molecular compound (A) with which a temperature-sensitive point differs from membrane formation nature. Under coexistence of polyvinyl ARUKO and/or a polyvinyl alcohol derivative, the main monomer (M) Or by using the giant-molecule emulsion characterized by containing at least the high molecular compound (A) obtained by carrying out the polymerization of the main monomer (M) and the submonomer (N) As compared with the case where the giant-molecule emulsion obtained like the bottom of the condition which does not live polyvinyl alcohol and/or a polyvinyl alcohol derivative together is used, the record medium which has the coating layer excellent in membrane formation nature and membrane formation reinforcement is obtained. Even if it compares with the case where what added polyvinyl alcohol and/or a polyvinyl alcohol derivative afterwards is used for the giant-molecule emulsion obtained by carrying out the polymerization of the main-under condition monomer (M) and the submonomer (N) which do not live polyvinyl alcohol and/or a polyvinyl alcohol derivative together by furthermore using the giant-molecule emulsion of this invention, the record medium which has the coating layer excellent in membrane formation nature and membrane formation reinforcement is obtained.

[0014] Although especially the polyvinyl alcohol and/or the polyvinyl alcohol derivative that are used for this invention are not limited Whenever [ saponification / which is generally called full saponification mold polyvinyl alcohol as polyvinyl alcohol ] 96% ~ 100% of polyvinyl alcohol, 76% ~ 95% of polyvinyl alcohol etc. is mentioned whenever [ saponification / which is generally called partial saponification mold polyvinyl alcohol ]. As a polyvinyl alcohol derivative, silanol denaturation polyvinyl alcohol, cation conversion polyvinyl alcohol, sulfhydryl group content polyvinyl alcohol, keto radical content polyvinyl alcohol, etc. are mentioned. The number of polyvinyl alcohol and/or polyvinyl alcohol derivatives one, and two or more classes may be mixed and they may be used. Although especially the polymerization degree of this polyvinyl alcohol and a polyvinyl alcohol derivative is not limited, the thing of polymerization degree 300-4000 is used preferably. Moreover, it is desirable to use keto radical content polyvinyl alcohol, to use the hydrazine derivative which has at least two below-mentioned hydrazine radicals and/or a below-mentioned semicarbazide radical, and to construct a bridge in this keto radical from a viewpoint of ink absorptivity.

[0015] The operating rate of the main monomer (M), a submonomer (N), polyvinyl alcohol, and/or a polyvinyl alcohol derivative It is decided in the range where the high molecular compound (A) obtained presents temperature responsibility. From a waterproof viewpoint of the coating film of the record medium finally obtained although not restricted into the range of these conditions, especially the content of the polyvinyl alcohol in a high molecular compound (A), or a polyvinyl alcohol derivative 0.1 ~ 50wt% is used preferably and is 0.5 ~ 20wt% still more preferably.

[0016] As a main monomer (M), they are N-alkyl or N-alkylene permutation (meta) acrylamide derivative (it is here). The vinyl methyl ether which writes an acrylic [ a meta-acrylic (or methacrylic) or an acrylic ] simple is mentioned. Specifically (Meta) For example N-ethyl (meta) acrylamide, N-isopropyl (meta) acrylamide, N-cyclo propyl (meta) acrylamide, N-ethyl (meta) acrylamide, N and N-diethyl acrylamide, N, and N-dimethyl (meta) acrylamide, N-n-propyl (meta) acrylamide, N-methyl-N-n-propyl acrylamide, N-methyl-N-isopropyl acrylamide, N-(meta) acryloyl pyrrolidine, N-(meta) acryloyl piperidine, N-tetrahydrofurfuryl (meta) acrylamide, N-methoxy propyl (meta) acrylamide, N-ethoxy propyl (meta) acrylamide, N-isopropoxy propyl (meta) acrylamide, N-ethoxyethyl (meta) acrylamide, N-(2 and 2-dimethoxy ethyl)-N-methylacrylamide, N-methoxy ethyl (meta) acrylamide, N-(meta) acryloyl morpholine, etc. are mentioned. [0017] with desirable N-isopropyl acrylamide [ from a viewpoint of membrane formation nature ], N-n-propyl acrylamide, N, and N-diethyl acrylamide and N-acryloyl morpholine As a submonomer (N), an oleophilic vinyl compound, a hydrophilic vinyl compound, an ionicity vinyl compound, etc. are mentioned. Specifically As an oleophilic vinyl compound, methyl (meta) acrylate, ethyl (meta) acrylate, n-butyl (meta) acrylate, 2-ethylhexyl (meta) acrylate,

Glycidyl methacrylate, styrene, alpha methyl styrene, ethylene, An isoprene, a butadiene, vinyl acetate, a vinyl chloride, etc. are mentioned. As a hydrophilic vinyl compound, 2-hydroxyethyl (meta) acrylate, 2-hydroxypropyl (meta) acrylate, acrylamide (meta), N-methyl (meta) acrylamide, N-methylol acrylamide, Diacetone acrylamide, methylenebis acrylamide, 2-methyl-5-vinylpyridine, An N-vinyl-2-pyrrolidone, N-acryloyl pyrrolidine, acrylonitrile, \*\*\*\* is mentioned. As an ionicity vinyl compound An acrylic acid, a methacrylic acid, An itaconic acid, FU The Mull acid, a maleic acid, a crotonic acid, BUTENTORI carvone Acid, Maleic-acid monoethyl, maleic-acid monomethyl, I TAKON acid monoethyl, Carboxylic-acid radical content monomers, such as itaconic-acid monomethyl, 2-acrylamido-2-methyl propane sulfonic acid, Amino-group content monomers, such as sulfonic group content monomer [ , such as a styrene sulfonic acid, a vinyl sulfonic acid and an acrylic (meta) sulfonic acid, ], N, and N-dimethylaminoethyl (meta) acrylate, N, and N-diethylaminoethyl (meta) acrylate, etc. are mentioned. Especially, methyl (meta) acrylate, n-butyl (meta) acrylate, 2-ethylhexyl (meta) acrylate, styrene, 2-hydroxypropyl (meta) acrylate, acrylamide, meta-acrylamide, diacetone acrylamide, and methylenebis acrylamide are used preferably. moreover, from a viewpoint of the membrane formation nature of the coating layer obtained using the giant-molecule emulsion of this invention An acrylic acid, a methacrylic acid, an itaconic acid, a fumaric acid, a maleic acid, a crotonic acid, Butene tricarboxylic acid, maleic-acid monoethyl, maleic-acid monomethyl, Carboxylic-acid radical content monomers, such as itaconic-acid monoethyl and itaconic-acid monomethyl, 2-acrylamido-2-methyl propane sulfonic acid, a styrene sulfonic acid, It is desirable to use anion radical content monomers, such as sulfonic group content monomers, such as a vinyl sulfonic acid and an acrylic (meta) sulfonic acid, and especially the thing for which carboxylic-acid radical content monomers, such as an acrylic acid, a methacrylic acid, an itaconic acid, a fumaric acid, and a maleic acid, are used is desirable.

[0018] The copolymerization rate of the main monomer (M) and a submonomer (N) is decided bordering on temperature with the fixed copolymerization high molecular compound obtained in the range where a hydrophilic property and hydrophobicity present the temperature responsibility which changes reversibly. The copolymerization high molecular compound which will be obtained if there are too many rates of a submonomer (N) stops that is, showing this temperature responsibility. That is, although it depends for the copolymerization rate of the main monomer (M) and a submonomer (N) on the combination of the monomer kind to be used, below 50 mass % of the rate of the submonomer (N) in the high molecular compound (A) obtained is desirable. Furthermore, it is below 30 mass % preferably. Moreover, in order to discover the addition effectiveness of a submonomer (N) better, more than 0.01 mass % is desirable.

[0019] In this invention, the "temperature-sensitive point" of a high molecular compound (A) is temperature from which the hydrophilic-hydrophobicity changes, and "temperature responsibility" means the property which shows change of this hydrophilic-hydrophobicity. In this invention, moreover, the direction of the condition of having dissolved with water a high molecular compound (A) in the system in which a high molecular compound (A) and water coexist with a "hydrophilic property" Meaning that it is more stable than the condition of having carried out phase separation, "hydrophobicity" means that the condition of a high molecular compound (A) of having carried out phase separation to water is more stable than the condition of having dissolved in the system with which a high molecular compound (A) and water coexist. This hydrophilic property - A hydrophobic change appears as a soluble abrupt change to the rapid viscosity change accompanying the temperature change of the system with which a high molecular compound (A) and water coexist or the abrupt change of the transparency of the system with which a high molecular compound (A) and water coexist, and the water of a high molecular compound (A). namely, the viscosity when reducing gradually the temperature of the system with which a high molecular compound (A) and water coexist from the temperature field (temperature higher than a temperature-sensitive point) where a high molecular compound (A) shows hydrophobicity as the transition point when the temperature-viscosity curve measured and obtained changes rapidly Or when the water dispersion of the high molecular compound (A) with which a high molecular compound (A) is obtained in the temperature field (temperature higher than a temperature-sensitive point) which shows hydrophobicity is cooled gradually, these



dispersion liquid can search for the temperature-sensitive point of a high molecular compound (A) as the rarefaction or temperature which it begins to gel.

[0020] The giant-molecule emulsion of this invention has the temperature (temperature-sensitive point) which produces viscosity change rapidly under the effect of the change of hydrophilic-hydrophobicity by the temperature change of the high molecular compound (A) to contain, namely, as the transition point when the temperature-viscosity curve which measures the viscosity at the time of making it fall gradually, and is obtained from the temperature field (temperature higher than a temperature-sensitive point) where the high molecular compound (A) which contains the temperature of the giant-molecule emulsion of this invention in this emulsion shows hydrophobicity changes rapidly Or when it is made to fall gradually from the temperature field (temperature higher than a temperature-sensitive point) where the high molecular compound (A) which contains the temperature of the giant-molecule emulsion of this invention in this giant-molecule emulsion shows hydrophobicity A \*\*\*\* giant-molecule emulsion can search for the temperature-sensitive point of a high molecular compound (A) as the rarefaction or temperature which it begins to gel.

[0021] In many cases, since optical endurance is high as compared with the color ink which has a cation radical, it is desirable to use the color ink which has an anion radical in ink jet record, when using the giant-molecule emulsion of this invention in ink jet record-medium manufacture. Therefore, it is desirable to add cationic compounds, such as a cationic giant molecule and a cationic particle, in the coating liquid for ink jet record media in order to fix to a record medium the color ink which has the anion radical concerned, and it is more desirable that a high molecular compound (A) is cationicity or nonionic from a viewpoint of the ease of this coating liquid preparation. It is desirable to use the ethylene nature partial saturation monomer which can obtain a cationic high molecular compound (A) by including an ethylene nature partial saturation monomer with a cation radical as a submonomer (N) used for a polymerization, and has at least one or more kinds of cation radicals from this viewpoint as a submonomer (N). The ethylene nature partial saturation monomer with this cation radical can also be respectively used combining one sort or two sorts or more of things. It is more desirable to contain the 3rd class amino group and/or a quarternary-ammonium-salt radical as an ethylene nature partial saturation monomer with this cation radical especially from the viewpoint of the degree of fading [ which is produced when the printed matter which printed by using an ink jet printer for the record medium obtained by sunlight or the light of a fluorescent lamp is put ], and a viewpoint of the colloid stability of the giant-molecule emulsion obtained.

[0022] The high molecular compound (A) containing the 3rd class amino group and/or a quarternary-ammonium-salt radical carries out copolymerization of for example, the main monomer (M) and the monomer which contains the 3rd class amino group and/or a quarternary-ammonium-salt radical as a submonomer (N), and is obtained. It can also use combining one sort or two sorts or more of things respectively, (including the monomer containing the 3rd class amino group and/or a quarternary-ammonium-salt radical). [ the main monomer (M), a submonomer (N), and ]

[0023] As the 3rd class amino group or a quarternary-ammonium-salt radical content monomer Although it will not be restricted especially if it has the structure containing the 3rd class amino group or a quarternary-ammonium-salt radical and is in a monomer Vinyloxyethyl trimethyl ammonium chloride, 2, 3-dimethyl-1-vinyl imidazolinium chloride, TORIMECHIRU-(3-(meta) acrylamide -3, 3-dimethyl propyl) ammoniumchloride, TORIMECHIRU-(3-methacrylamide propyl) ammoniumchloride, TORIMECHIRU-(3-acrylamide propyl) ammoniumchloride, N-(1 and 1-dimethyl-3-dimethylaminopropyl) (meta) acrylamide and its quarternary ammonium salt, TORIMECHIRU-(3-(meta) acrylamide) ammoniumchloride, 1-vinyl-2-methylimidazole, a 1-vinyl-2-ethyl-imidazole, 1-vinyl-2-phenylimidazole, 1-vinyl - 2, 4, a 5-TORIMECHIRU-imidazole, N and N-dimethylaminopropyl (meta) acrylate and its quarternary ammonium salt, N and N-dimethylaminoethyl (meta) acrylate and its quarternary ammonium salt, N and N-diethylaminoethyl (meta) acrylate and its quarternary ammonium salt, t-butylamino ethyl (meta) acrylate and its quarternary ammonium salt, N-(3-dimethylaminopropyl) methacrylamide and its quarternary ammonium salt, N-(3-dimethylaminopropyl) acrylamide and its quarternary

ammonium salt, N-(3-diethylamino propyl) methacrylamide and its quarternary ammonium salt, N-(3-diethylamino propyl) acrylamide and its quarternary ammonium salt, o-, m-, p-amino styrene and its quarternary ammonium salt, o-, m-, p-vinylbenzyl amine, and its quarternary ammonium salt, N-(vinylbenzyl) pyrrolidone, N-(vinylbenzyl) piperidine, N-vinyl imidazole and its quarternary ammonium salt, a 2-methyl-1-vinyl imidazole, and its quarternary ammonium salt, An N-vinyl-pyrrolidone and its quarternary-ammonium-salt, N, and N'-divinyl ethylene urea and its quarternary ammonium salt, alpha- or beta-vinylpyridine and its quarternary-ammonium-salt, alpha-, or beta-vinyl piperidine and its quarternary ammonium salt, 2- or 4-vinyl quinoline, its quarternary ammonium salt, etc. are illustrated. Especially, the 4th class compound of methyl chloride of N and N-dimethylaminopropyl methacrylate, N, and N-dimethylaminoethyl methacrylate, N, and N-dimethylaminopropyl (meta) acrylamide is used preferably.

[0024] The copolymerization rate of the submonomer (N) containing the main monomer (M), the 3rd class amino group, and/or a quarternary-ammonium-salt radical content monomer is decided in the range where the copolymerization high molecular compound obtained presents the temperature responsibility from which a hydrophilic property and hydrophobicity change reversibly bordering on a temperature-sensitive point. Although the 3rd class amino group in a high molecular compound (A) used for this invention and/or especially the content of a quarternary-ammonium-salt radical content monomeric unit are not restricted into the range of the above-mentioned conditions, the viewpoint of the ease of coating liquid adjustment to more than its 0.01 mass % is desirable, and below its 50 mass % is desirable from a viewpoint of membrane formation nature. Furthermore, it is 0.1 to 30 mass % preferably.

[0025] Furthermore, it is more more desirable to use a quarternary-ammonium-salt radical content monomer rather than the 3rd class amino-group content monomer from a viewpoint of the degree of fading [ which is produced when printed matter is put to sunlight or the light of a fluorescent lamp ]. Furthermore, it is desirable to contain both the 3rd class amino group and a quarternary-ammonium-salt radical content monomer, and said anion radical content monomer from a viewpoint of both membrane formation nature \*\*s of the coating layer obtained using the ease of this above-mentioned coating liquid preparation, and the giant-molecule emulsion of this invention, and it is desirable. [ of especially the thing for which this anion radical content monomer uses carboxylic-acid radical content monomers, such as an acrylic acid, a methacrylic acid, an itaconic acid, a fumaric acid, and a maleic acid, ]

[0026] Although especially the glass transition point of a high molecular compound (A) used for this invention is not limited, viewpoints, such as membrane formation nature and the flexibility of the record medium obtained, to a glass transition point has desirable -50-150 degrees C, and -50-30 degrees C is desirable from a viewpoint of the flexibility grant to the record medium generally obtained. However, when thinking as important the flexibility of an ink jet record medium and the transparency of an ink absorption layer desirable [ 30-130 ] and acquired when thinking as important the ink absorptivity of the ink jet record medium obtained when using the giant-molecule emulsion of this invention for ink jet record-medium manufacture, a glass transition point's -50-30 degrees C are desirable. Moreover, when using the giant-molecule emulsion of this invention for thermal recording medium manufacture, viewpoints, such as welding to an electrothermal recording head, to a glass transition point has desirable 80-150 degrees C. Although especially the temperature-sensitive point of a high molecular compound (A) of using for this invention is not limited, 5-100 degrees C is desirable from viewpoints, such as coating workability and membrane formation nature, 5-50 degrees C is still more desirable, and 10-40 degrees C is the most desirable.

[0027] In this invention, the manufacture approach (said 3) of a giant-molecule emulsion and invention of 4 are also offered. It is desirable to face to manufacture the giant-molecule emulsion of this invention, and to perform a polymerization reaction in a temperature field higher than the temperature-sensitive point of a high molecular compound (A). Since a high molecular compound (A) shows hydrophobicity and an emulsion is formed in this temperature field, in this temperature field, the giant-molecule emulsion of this invention is obtained by using the manufacturing technology of a giant-molecule emulsion under coexistence of polyvinyl alcohol and/or a polyvinyl alcohol derivative. Dissolve a surface active agent in water, a copolymerization

monomer component, such as said polyvinyl alcohol and/or a polyvinyl alcohol derivative, the main monomer (M), and a submonomer (N), is made to specifically add and emulsify, and the approach of supplying the above-mentioned copolymerization component and a radical polymerization initiator to the system of reaction at the system of reaction by approaches, such as continuation dropping besides [ which adds a radical polymerization initiator and performs an emulsion polymerization by the reaction by package preparation ] an approach, and division addition, is mentioned.

[0028] It is desirable to set to manufacture the giant-molecule emulsion containing the high molecular compound (A) used for this invention, and to use a surfactant. The giant-molecule emulsions of this invention may be any of anionic, cationicity, nonionic, and both sexes. When the giant-molecule emulsion containing a high molecular compound (A) is anionic, an anionic surfactant and/or a nonionic surfactant are used. For example, fatty-acid soap, an alkyl sulfonate, alkyl sulfo succinate, Polyoxyethylene alkyl sulfate, a polyoxyethylene alkyl aryl sulfate, p-styrene sulfonate, alkyl naphthalenesulfonate, a naphthalene sulfonate, Formaldehyde polycondensation, the condensate of a higher fatty acid and amino acid, a dialkyl sulfo succinate salt, Alkyl ether carboxylate, such as naphthenate, acyl peptide, Alpha olefin sulfo N acid chloride, sodium N-acyl methyl taurate, alkyl ether sulfate, Anionic surfactants, such as the second class higher-alcohol ethoxy sulfate, polyoxyethylene alkylphenyl ether sulfate, monoglylsulfate, an alkyl ether phosphoric ester salt, and an alkyl phosphoric ester salt, are mentioned. As a nonionic surfactant, polyoxyethylene alkyl aryl ether, polyoxyethylene alkyl phenyl ether, polyoxyethylene sorbitan fatty acid ester, an oxyethylene oxypropylene block copolymer, polyglyceryl fatty acid ester, etc. are mentioned.

[0029] Moreover, when the giant-molecule emulsion containing a high molecular compound (A) is cationicity, a cationic surfactant and/or a nonionic surfactant are used. For example, as a cationic surface active agent, a lauryl amine hydrochloride, alkyl benzyl dimethylammonium chloride, lauryl trimethylammonium chloride, alkyl ammonium hydroxide, polyoxyethylene alkylamine, etc. are mentioned, and polyoxyethylene alkyl aryl ether, polyoxyethylene alkyl phenyl ether, polyoxyethylene sorbitan fatty acid ester, an oxyethylene oxypropylene block copolymer, polyglyceryl fatty acid ester, etc. are mentioned as a nonionic surfactant.

[0030] A nonionic surfactant is used when the giant-molecule emulsion containing a high molecular compound (A) is nonionic. As a nonionic surfactant, polyoxyethylene alkyl aryl ether, polyoxyethylene alkyl phenyl ether, polyoxyethylene sorbitan fatty acid ester, an oxyethylene oxypropylene block copolymer, polyglyceryl fatty acid ester, etc. are mentioned. When the giant-molecule emulsions containing a high molecular compound (A) are both sexes, it is desirable from a viewpoint of stability over change of pH of a giant-molecule emulsion to use an amphoteric surface active agent, but when this giant-molecule emulsion shows cationicity in the coating liquid of this invention, a cationic surface active agent can be used, and when this giant-molecule emulsion shows anionic in the coating liquid of this invention, a cationic surface active agent can be used. Carboxy betaine, aminocarboxylate, lecithin, etc. are mentioned as an amphoteric surface active agent.

[0031] It is 1 - 30 mass section that it is 0.05 - 50 mass section as amount of these surface active agents used to the fat solid content 100 mass section of the giant-molecule emulsion containing a high molecular compound (A) desirable still more preferably. this invention -- setting -- said surfactant -- an one-sort independent -- it can also be used -- moreover -- The two or more sorts can also be used together. It is desirable to reduce the amount of the nonresponsive surfactant used as if "the surfactant which has a reactant radical" is used at the time of the giant-molecule emulsion polymerization containing the high molecular compound (A) of this invention, be alike from a waterproof viewpoint of the image printed to the record medium obtained. Generally the surfactant which has a reactant radical is called a reactive surface active agent, and can mention the compound which has a hydrophobic group, a hydrophilic group, and a reactant radical in a molecule. As this reactant radical, the functional group which has carbon-carbon double bonds, such as an allyl group (meta), 1-propenyl radical, a 2-methyl-1-propenyl radical, an isopropenyl radical, a vinyl group, and an acryloyl (meta) radical, is mentioned, for example.

[0032] As a reactive surface active agent which has anionic As a vinyl monomer which the thing containing structures, such as a sulfonate radical, a sulfate base, a carboxylate radical, and a phosphate radical, is mentioned, and has a sulfonate radical For example, an allyl compound sulfonic acid, 2-methyl allyl compound sulfonic acid, a vinyl sulfonic acid, 4-vinylbenzene sulfonic acid, 2-(meth)acryloyloxy ethane sulfonic acid, What is obtained by neutralizing various kinds of sulfonic group content vinyl monomers, such as 3-(meth)acryloyloxy propane sulfonic acid and 2-acrylamido-2-methyl propane sulfonic acid, with various kinds of basic compounds is mentioned. As this basic compound, a lithium hydroxide, a sodium hydroxide, a potassium hydroxide, ammonia, monomethylamine, ethylamine, n butylamine, dimethylamine, diethylamine, a trimethylamine, triethylamine, tree n butylamine, diethanolamine, 2-dimethylamino ethyl alcohol, tetramethylammonium hydroxide, tetra--n-butyl ammonium hydro KISAIDO, etc. are mentioned. What is obtained by neutralizing the vinyl monomers containing sulfate radicals, such as a sulfate of allyl alcohol, with said various basic compounds as a vinyl monomer containing a sulfate base is mentioned. What is obtained as a vinyl monomer containing a phosphate radical by neutralizing phosphate group content vinyl monomers, such as for example, monochrome {2-(meta) AKURIROIRUO KISHIECHIRU} acid phosphate, with said various basic compounds is mentioned. as the reactive surface active agent which has anionic [ containing an allyl group ( $\text{CH}_2=\text{C}(\text{R})-\text{CH}_2-$ ) (however, R alkyl group) ] -- for example The sulfate salt of the polyoxyethylene ARIRUGURISHIJIRU nonylphenyl ether etc. is mentioned. As a commercial item "ADEKA rear soap SE-10N" series (trademark: Asahi Denka Kogyo K.K. make), There are "elemi Norian JS-2" (trademark: Sanyo Chemical Industries, Ltd. make), "radio-and-TV mull S-180 or S-180A" (trademark: Kao Corp. make), "H3390A", "H3390B" (trademark: Dai-Ichi Kogyo Seiyaku Co., Ltd. make), etc. (Meta) As a reactive surface active agent which has anionic [ containing an acryloyl radical ( $\text{CH}_2=\text{C}(\text{R})-\text{C}(=\text{O})-\text{O}-$ ) (however, R alkyl group) ], "elemi Norian RS-30" series (trademark: Sanyo Chemical Industries, Ltd. make), "Antox MS-60" series (trademark: product made from Japanese Emulsifier), etc. are mentioned as a commercial item. As a reactive surface active agent which has anionic [ containing a propenyl radical ( $\text{CH}_3-\text{CH}=\text{CH}-$ ) ], the sulfate ammonium salt of for example, polyoxyethylene nonyl propenyl phenyl ether etc. is mentioned, and there are "Aqualon HS-10" series, "Aqualon BC" series (trademark: Dai-Ichi Kogyo Seiyaku Co., Ltd. make), etc. as a commercial item.

[0033] The cationic vinyl monomers which contain the structure of having cationicity, such as an amino base, as a reactive surface active agent which has cationicity are mentioned. As a vinyl monomer which has an amino base, they are allylamine, and N and N, for example. - What is obtained by neutralizing the amino-group content vinyl monomers of dimethyl allylamine, N, and N-diethyl allylamine, N, and N-diethylamino propyl vinyl ether with various, acid compounds is mentioned. As this acid compound, a hydrochloric acid, formic acid, an acetic acid, a lauryl acid, etc. are mentioned. As a commercial item of the reactive surface active agent which has cationicity, "RF-751" (trademark: product made from Japanese Emulsifier), "BUREMMA QA" (trademark: Nippon Oil & Fats Co., Ltd. make), etc. are mentioned.

[0034] as a nonionic reactive surface active agent -- a polyoxyethylene-alkyl-ether, polyoxyethylene-alkyl-phenyl-ether, polyoxyethylene higher-fatty-acid ester, and polyoxyethylene-polyoxypropylene block copolymer -- the monomers of the vinyl ether which has various kinds of polyether chains [ like ] in a side chain, allyl compound ether, or (meta) acrylic ester are mentioned. As a nonionic reactive surface active agent containing an allyl group ( $\text{CH}_2=\text{C}(\text{R})-\text{CH}_2-$ ) (however, R alkyl group), for example, the polyoxyethylene ARIRUGURISHIJIRU nonylphenyl ether is mentioned, and there is "ADEKA rear soap NE" series (the Asahi electrification company make) etc. as a commercial item. (Meta) As a nonionic reactive surface active agent containing an acryloyl radical ( $\text{CH}_2=\text{C}(\text{R})-\text{C}(=\text{O})-\text{O}-$ ) (however, R alkyl group), "RMA-560" series (Japanese emulsifier company make), "BUREMMA PE" series (Nippon Oil & Fats Co., Ltd. make), etc. are mentioned as a commercial item. As a nonionic reactive surface active agent containing a propenyl radical ( $\text{CH}_3-\text{CH}=\text{CH}-$ ), for example, polyoxyethylene nonyl propenyl phenyl ether is mentioned, and there is "Aqualon RN series" (Dai-Ichi Kogyo Seiyaku Co., Ltd. make) etc. as a commercial item.

[0035] It is 1 - 50 mass section that it is the 0.05 - 100 mass section as amount of these

reactive surface active agents used to the giant-molecule emulsion resin solid content 100 mass section containing a high molecular compound (A) desirable still more preferably. this invention -- setting -- said reactive surface active agent -- an one-sort independent -- it can also be used -- moreover -- The two or more sorts can also be used together, and it can also use together with the surfactant which does not have said reactivity further.

[0036] In many cases, since optical endurance is high as compared with the color ink which has a cation radical, it is desirable to use the color ink which has an anion radical in ink jet record, when using the giant-molecule emulsion of this invention in ink jet record-medium manufacture. Therefore, it is desirable to add cationic compounds, such as a cationic giant molecule and a cationic particle, in the coating liquid for ink jet record media in order to fix the color ink which has the anion radical concerned, and it is more desirable to use a cationic surfactant or a nonionic surfactant for the giant-molecule emulsion which contains a high molecular compound (A) from a viewpoint of the ease of this coating liquid preparation. It is desirable that the giant-molecule emulsion which contains a high molecular compound (A) in it from a viewpoint of the ease of this coating liquid preparation especially when the particle which uses silicas (silicon oxide), such as a dry type silica, as a principal component as a particle (C) mentioned later is used for coating liquid contains a cationic surfactant. Although the particle which uses a silica as a principal component when the giant-molecule emulsion of this invention contains only a nonionic surfactant although this reason is not clear produced condensation and adjustment of coating liquid was not easy, it turned out that it is hard that it comes to generate an aggregate by content of a cationic surfactant.

[0037] Although especially the mean particle diameter of the giant-molecule emulsion particle of this invention is not limited, a 10-200nm thing is 10-100nm desirable still more preferably from viewpoints, such as manufacture effectiveness of the membrane formation nature of a coating layer, and a giant-molecule emulsion. When using the giant-molecule emulsion of this invention in ink jet record-medium manufacture, it is desirable that it is especially 100nm or less from the transparency of a coating layer and a color-enhancing viewpoint. The mean particle diameter said here is number average particle diameter of the giant-molecule emulsion by which a high molecular compound (A) is measured by dynamic light scattering in the temperature field which shows hydrophobicity.

[0038] It is desirable from a viewpoint of membrane formation nature to contain the particle formed of the core section which consists of a particle (B) into the coating liquid in front of coating, and the shell section which contains a high molecular compound (A) around this core section. Although the particle (B) which forms the core section may be an organic high molecular compound and you may be a non-subtlety particle, from a viewpoint of the flexibility of the coating film finally obtained, an organic high molecular compound is more desirable, and a non-subtlety particle is more desirable from viewpoints, such as magnitude of the void volume of the coating film finally obtained, and ink absorptivity. Here, the periphery of the range which moves together with the core section in the inside of a medium is meant as the perimeter of the core section.

[0039] The giant-molecule emulsion formed of the core section which consists of a particle (B), and the shell section which contains a high molecular compound (A) around this core section After compounding the particle (B) used as the core section at the reaction of a first stage story, it can manufacture by the same reaction as the synthetic approach of the giant-molecule emulsion containing the above-mentioned high molecular compound (A) after teaching the particle (B) used as the core section prepared separately to the system of reaction etc. In this invention, although it may be any of anionic, cationicity, nonionic, and both sexes, since it is more desirable that there is a high molecular compound (A) with cationicity as mentioned above, when carrying out the polymerization of the giant-molecule emulsion which contains this high molecular compound (A) in the shell section, as for the viewpoint of polymerization stability to a particle (B), it is more desirable [ a particle (B) ] that it is cationicity.

[0040] Although especially a limit does not have the ratio (a core / shell ratio (mass ratio)) of the core section which consists of a particle (B), and the shell section containing the high molecular compound around this core section (A), viewpoints, such as membrane formation

nature, and paint film reinforcement of the coating layer obtained, ink absorptivity, to the range of  $1/10 - 10/1$  is desirable. When a particle (B) is an organic high molecular compound, as the example For example, the radical polymerization in the inside of an aqueous medium, The conventionally well-known Pori (meta) acrylate system obtained by anionic polymerization, cationic polymerization, etc., A polyvinyl acetate system, vinyl acetate-acrylic, an ethylene vinyl acetate system, A silicone system, a poly-butadiene system, a styrene butadiene system, an NBR system, A polyvinyl chloride system, a chlorination polypropylene system, a polyethylene system, a polystyrene system, Copolymers, such as a vinylidene-chloride system, a polystyrene-(meta) acrylate system, and a styrene-maleic-anhydride system, three-dimensions bridge formation resin, etc. are mentioned, and denaturation copolymers, such as silicone denaturation acrylic, fluorine-acrylic, acrylic silicon, and epoxy-acrylic, are also contained. A particle (B) can contain these kinds or two sorts or more. Here, it writes an acrylate (meta) system [ a methacrylate system (or methacrylate system) or an acrylate system ] simple. The organic high molecular compound especially classified into a Pori (meta) acrylate system (acrylic high molecular compound) and/or a polystyrene-(meta) acrylate system (styrene-acrylic high molecular compound) is preferably used from viewpoints, such as the transparency of the coating layer finally obtained, and light-proof xanthochroism, the shelf life of the record medium obtained.

[0041] As for the particle in the case of being an organic high molecular compound (B), being obtained as a giant-molecule emulsion is desirable. It is obtained by using the manufacturing technology of a giant-molecule emulsion known widely. Specifically Dissolve the above-mentioned surfactant in an aqueous solvent, and it is made to add and emulsify the monomer component mentioned later. The approach of supplying the above-mentioned copolymerization component and a radical polymerization initiator to the system of reaction at the system of reaction by approaches, such as continuation dropping besides [ which adds a radical polymerization initiator and performs an emulsion polymerization by the reaction by package preparation ] an approach, and division addition, is mentioned.

[0042] As a monomer (monomer (L)) for obtaining the particle in the case of being an organic high molecular compound (B), it can use combining one sort or two sorts or more of things of an ethylene nature partial saturation monomer. Acrylic ester (meta), an acrylamide (meta) system monomer, and vinylcyanides are specifically mentioned. As an example of acrylic ester (meta) The carbon number of the alkyl section The acrylic-acid (meta) alkyl ester of 1-18, The carbon number of the alkyl section The acrylic-acid (meta) hydroxyalkyl ester of 1-18, The number of ethyleneoxide radicals 1-100 oxyethylene (Pori) (meta) acrylate, The number of 1-100 oxypropylene (Pori) (meta) acrylate and ethyleneoxide radicals is mentioned [ 1-100 oxy-(Pori) ECHIRENJI (meta) acrylate etc. ] for the number of propylene oxide radicals. The carbon number of the alkyl section is mentioned for a methyl acrylate (meta), an ethyl acrylate (meta), acrylic-acid (meta) n-butyl, 2-ethylhexyl acrylate (meta), acrylic-acid (meta) cyclohexyl, acrylic-acid (meta) methylcyclohexyl, acrylic-acid (meta) dodecyl, etc. as an example of the acrylic-acid (meta) alkyl ester of 1-18. The carbon number of the alkyl section is mentioned for acrylic-acid (meta) 2-hydroxyethyl, 2-hydroxypropyl acrylate (meta), acrylic-acid (meta) 2-hydroxy cyclohexyl, acrylic-acid (meta) dodecyl, etc. as an example of the acrylic-acid (meta) hydroxyalkyl ester of 1-18. The number of ethyleneoxide radicals is mentioned for acrylic-acid (meta) ethylene glycol, methoxy (meta) acrylic-acid ethylene glycol, an acrylic-acid (meta) diethylene glycol, a methoxy (meta) acrylic-acid diethylene glycol, acrylic-acid (meta) tetraethylene glycol, methoxy (meta) acrylic-acid tetraethylene glycol, etc. as an example of 1-100 oxyethylene (Pori) (meta) acrylate. The number of propylene oxide radicals is mentioned for acrylic-acid (meta) propylene glycol, methoxy (meta) acrylic-acid propylene glycol, acrylic-acid (meta) dipropylene glycol, methoxy (meta) acrylic-acid dipropylene glycol, an acrylic-acid (meta) tetrapropylene glycol, a methoxy (meta) acrylic-acid tetrapropylene glycol, etc. as an example of 1-100 oxypropylene (Pori) (meta) acrylate. The number of ethyleneoxide radicals is mentioned for JI (meta) acrylic-acid ethylene glycol, a JI (meta) acrylic-acid diethylene glycol, a methoxy (meta) acrylic-acid diethylene glycol, JI (meta) acrylic-acid tetraethylene glycol, etc. as an example of 1-100 oxy-(Pori) ECHIRENJI (meta) acrylate. (Meta) As acrylamide system

monomers, there are acrylamide, N-methylol (meta) acrylamide, N-butoxy methyl (meta) acrylamide, diacetone acrylamide, etc., for example (meta), and there is acrylonitrile etc. as vinylcyanides, for example (meta). As examples other than the above, for example Moreover, olefins, such as ethylene, a propylene, and an isobutylene Halo olefins, such as dienes, such as a butadiene, a vinyl chloride, and a vinylidene chloride Vinyl acetate, propionic-acid vinyl, n-butanoic acid vinyl, benzoic-acid vinyl, P-tert-butylbenzoic acid vinyl, vinyl pivalate, 2-ethylhexanoic acid vinyl, Carboxylic-acid vinyl ester, such as BASA tic acid vinyl and lauric-acid vinyl Carboxylic-acid isopropenyl ester, such as isopropenyl acetate and propionic-acid isopropenyl Vinyl ether, such as ethyl vinyl ether, isobutyl vinyl ether, and cyclohexyl vinyl ether Aromatic series vinyl compounds, such as styrene derivatives, such as styrene and methyl styrene, and vinyltoluene, Allyl ester, such as an acetic-acid allyl compound and allyl benzoate, allyl compound ethyl ether, Allyl compound ether, such as allyl glycidyl ether and allyl compound phenyl ether, Furthermore, gamma-(meta) acryloxypropyltrimethoxysilane, vinylmethyldiethoxysilane, Vinylmethyldimethoxysilane, a vinyl dimethylethoxy silane, vinyl dimethylmethoxysilane, Vinyltrimethoxysilane, vinyltriethoxysilane, 4-(meth)acryloyloxy - 2, 2, 6, and 6-tetramethylpiperidine, 4-(meth)acryloyloxy - 1, 2, 2, 6, and 6-pentamethylpiperidine, Perfluoro methyl (meta) acrylate, perfluoro propyl (meta) acrylate, Perfluoro PUOPIRO methyl (meta) Acrylate, vinyl pyrrolidone, TORIMECHIRORU pro pantry (meta) acrylate, metaglycidyl acrylate (meta), An acrylic acid 2, 3-cyclohexene oxide, an acrylic-acid (meta) allyl compound, (Meta) Methacrylic-acid acid phosphoxy ethyl, methacrylic-acid 3-chloro-2-acid phosphoxy propyl, Methyl propane sulfonic-acid acrylamide, a divinylbenzene, an acrylic acid, A methacrylic acid, an itaconic acid, a fumaric acid, a maleic acid, a crotonic acid, butene tricarboxylic acid, Maleic-acid monoethyl, maleic-acid monomethyl, itaconic-acid monoethyl, Carboxylic-acid radical content monomers, such as itaconic-acid monomethyl, 2-acrylamido-2-methyl propane sulfonic acid, Amino-group content monomers, such as sulfonic group content monomer [ , such as a styrene sulfonic acid, a vinyl sulfonic acid and an acrylic (meta) sulfonic acid, ], N, and N-dimethylaminoethyl (meta) acrylate, N, and N-diethylaminoethyl (meta) acrylate, etc. are mentioned. Here, it writes an acrylic [ a meta-acrylic (or methacrylic) or an acrylic ] (meta) simple.

[0043] From a viewpoint of the membrane formation nature of the coating layer obtained using the giant-molecule emulsion of this invention An acrylic acid, a methacrylic acid, an itaconic acid, a fumaric acid, a maleic acid, a crotonic acid, Butene tricarboxylic acid, maleic-acid monoethyl, maleic-acid monomethyl, Carboxylic-acid radical content monomers, such as itaconic-acid monoethyl and itaconic-acid monomethyl, 2-acrylamido-2-methyl propane sulfonic acid, a styrene sulfonic acid, It is desirable to use anion radical content monomers, such as sulfonic group content monomers, such as a vinyl sulfonic acid and an acrylic (meta) sulfonic acid, and especially the thing for which carboxylic-acid radical content monomers, such as an acrylic acid, a methacrylic acid, an itaconic acid, a fumaric acid, and a maleic acid, are used is desirable.

[0044] Although especially a limit does not have the glass transition point of the particle in the case of being an organic high molecular compound (B), the viewpoint of membrane formation nature to a glass transition point has desirable -50-150 degrees C, and -50-30 degrees C is desirable from a viewpoint of the flexibility grant to the record medium generally obtained. However, when thinking as important the flexibility of an ink jet record medium and the transparency of an ink absorption layer desirable [ 30-130 ] and acquired when thinking as important the ink absorptivity of the ink jet record medium obtained when using the giant-molecule emulsion of this invention for ink jet record-medium manufacture, a glass transition point's -50-30 degrees C are desirable.

[0045] Although especially the number average particle diameter of the particle in the case of being an organic high molecular compound (B) is not limited, a 3-150nm thing is preferably used from viewpoints, such as manufacture effectiveness of the membrane formation nature of a coating layer, and a giant-molecule emulsion, and what is 10-100nm is still more desirable. However, when using the giant-molecule emulsion of this invention for ink jet record-medium manufacture, a 3-100nm thing is preferably used from viewpoints, such as the transparency of an ink absorption layer, color enhancement, and manufacture effectiveness of a giant-molecule



emulsion, and it is 5–70nm still more preferably, and is 10–50nm most preferably. The number average particle diameter said here is number average particle diameter measured by dynamic light scattering.

[0046] When the particle (B) which forms the core section is a non-subtlety particle, as a particle (B) For example, precipitated calcium carbonate, Whiting, a magnesium carbonate, a kaolin, clay, talc, A calcium sulfate, a barium sulfate, a titanium dioxide, a zinc oxide, zinc hydroxide, Zinc sulfide, zinc carbonate, a hydrotalcite, aluminum silicate, diatomaceous earth, A calcium silicate, a magnesium silicate, synthetic amorphous silica, colloidal silica, A dry type silica, an alumina, a colloidal alumina, a pseudo-boehmite system alumina, An aluminum hydroxide, a zeolite, a magnesium hydroxide, other zirconiums, Metallic oxides, such as titanium, a tantalum, niobium, tin, and a tungsten, Metallic phosphate, such as aluminum, vanadium, a zirconium, and a tungsten, etc. is mentioned, and the object which permuted these some minerals by other elements, and the object which reformed the front face by embellishing with the organic substance can also be used. Although one kind in these inorganic particle may be used independently and two or more kinds can also be used, especially the thing for which colloidal silica and a dry type silica are used as a particle (B) is desirable. It is desirable by using colloidal silica and a dry type silica from image quality with the good time of printing to the record medium obtained being acquired. It is not limited especially as colloidal silica, but the cationic colloidal silica obtained by the approach of reacting polyvalent metal compounds, such as usual anionic colloidal silica and aluminum ion, is used. Although not limited especially as a dry type silica, the gaseous-phase method silica compounded by burning with hydrogen and oxygen in tetrachlorosilane is used preferably. The object which could use as it is and embellished the front face with the silane coupling agent etc. is sufficient as a dry-process silica.

[0047] Moreover, when using the giant-molecule emulsion of this invention for ink jet record-medium manufacture, it is desirable to use alumina sol and a pseudo-boehmite system alumina particle as a particle (B). By using alumina sol and a pseudo-boehmite system alumina particle, a cationic giant-molecule emulsion can be obtained easily, the image quality when printing to the ink jet record medium obtained can improve, and the water resisting property of an image can be given.

[0048] The particle (B) which forms this core section may be used with a primary particle, and where an aggregated particle is formed, it can also be used. Moreover, although the particle diameter of the particle (B) which forms the core section can use anythings, in order to obtain a record medium with a smooth front face, a thing 10 micrometers or less is used for number average particle diameter, a thing 1 micrometer or less is used more preferably, and a thing 200nm or less is used still more preferably. Furthermore, when using the emulsion of this invention for ink jet record-medium manufacture, optical density (depth of shade) of the printing section after printing is made high, the particle (B) in which the number average particle diameter of a primary particle forms the core section 100nm or less in the purpose which acquires the gloss also similar to a film photo is used preferably, and a thing 50nm or less is used more preferably. Although especially the minimum of the particle diameter of the particle (B) which forms the core section is not limited, it is desirable that it is the number average particle diameter of about 3nm or more from a viewpoint of productivity.

[0049] The giant-molecule emulsion of this invention can also contain a hydrophilic property and the high molecular compound (D) in which a hydrophobic change is not shown by the temperature change of a solvent. A high molecular compound (D) is obtained by carrying out a polymerization combining one sort or two sorts or more of things of the monomer (monomer (L)) for obtaining the particle (B) in the case of being the submonomer (N) or the organic high molecular compound of for example, point \*\*. Furthermore, it is a hydrophilic property by the temperature change of a solvent. – One sort or two sorts or more of things of the main monomer (M) can also be contained within the limits of the presentation which does not show a hydrophobic change. When the existence of change of the hydrophilic property of the high molecular compound (D) obtained and hydrophobicity changes gradually the temperature of the high molecular compound in a water medium (D), the condition of the liquid is visually checked in change of the rarefaction, gelation, or nebula. Although it depends for the copolymerization rate



of a submonomer (N) and the main monomer (M) on the combination of the monomer kind to be used when obtaining a high molecular compound (D) by copolymerization of a submonomer (N) and the main monomer (M), below 50 mass % of the rate of the main monomer (M) is desirable, and below its 30 mass % is still more desirable. A giant-molecule emulsion can be made to contain a high molecular compound (D) using the same polymerization method as the particle (B) which consists of a high molecular compound (A) or an organic giant molecule. A high molecular compound (D) may be a hydrophilic property, and may be hydrophobicity. When the giant-molecule emulsion containing the high molecular compound (D) of a hydrophilic property is used for record-medium manufacture, better membrane formation nature is obtained and it is desirable. When the giant-molecule emulsion containing a hydrophobic high molecular compound (D) is used for record-medium manufacture, the coating liquid of higher solid content concentration can be obtained by hypoviscosity, a coating layer can be dried more efficiently and economically, and it is desirable. As a monomer used in order to obtain a high molecular compound (D) 2-hydroxyethyl (meta) acrylate, 2-hydroxypropyl (meta) acrylate, Acrylamide, diacetone acrylamide, an acrylic acid, (Meta) A methacrylic acid, an itaconic acid, a fumaric acid, a maleic acid, a crotonic acid, butene tricarboxylic acid, Maleic-acid monoethyl, maleic-acid monomethyl, itaconic-acid monoethyl, Itaconic-acid monomethyl, 2-acrylamido-2-methyl propane sulfonic acid, A styrene sulfonic acid, an acrylic (meta) sulfonic acid, a vinyl sulfonic acid, Methyl (meta) acrylate, n-butyl (meta) acrylate, 2-ethylhexyl (meta) acrylate, styrene, 2-hydroxypropyl (meta) acrylate, etc. are mentioned as a desirable example. moreover, from a viewpoint of the membrane formation nature of the coating layer obtained using the giant-molecule emulsion of this invention An acrylic acid, a methacrylic acid, an itaconic acid, a fumaric acid, a maleic acid, a crotonic acid, Butene tricarboxylic acid, maleic-acid monoethyl, maleic-acid monomethyl, Carboxylic-acid radical content monomers, such as itaconic-acid monoethyl and itaconic-acid monomethyl, 2-acrylamido-2-methyl propane sulfonic acid, a styrene sulfonic acid, It is desirable to use anion radical content monomers, such as sulfonic group content monomers, such as a vinyl sulfonic acid and an acrylic (meta) sulfonic acid, and especially the thing for which carboxylic-acid radical content monomers, such as an acrylic acid, a methacrylic acid, an itaconic acid, a fumaric acid, and a maleic acid, are used is desirable.

[0050] When using the giant-molecule emulsion of this invention in ink jet record-medium manufacture, it is desirable to add cationic compounds, such as a cationic giant molecule and a cationic particle, in order to fix to the coating liquid for ink jet record media the color ink which has an anion radical, and it is more desirable that a high molecular compound (D) is cationicity or nonionic from a viewpoint of the ease of this coating liquid preparation. A cationic high molecular compound (D) can be obtained by including an ethylene nature partial saturation monomer with a cation radical as a part of submonomer (N) used for a polymerization. The ethylene nature partial saturation monomer with this cation radical can also be respectively used combining one sort or two sorts or more of things. It is desirable to contain the 3rd class amino group and/or a quarternary-ammonium-salt radical as an ethylene nature partial saturation monomer with this cation radical especially from the viewpoint of the degree of fading [ which is produced when the printed matter which printed by using an ink jet printer for the record medium obtained by sunlight or the light of a fluorescent lamp is put ], and a viewpoint of the colloid stability of the giant-molecule emulsion obtained. Instantiation and the desirable example of the 3rd class amino group or a quarternary-ammonium-salt radical content monomer are the same as that of a high molecular compound (A).

[0051] Furthermore, it is desirable to contain both the 3rd class amino group and a quarternary-ammonium-salt radical content monomer, and said anion radical content monomer from a viewpoint of both membrane formation nature \*\*s of the coating layer obtained using the ease of the above-mentioned coating liquid preparation, and the giant-molecule emulsion of this invention, and it is desirable. [ of especially the thing for which this anion radical content monomer uses carboxylic-acid radical content monomers, such as an acrylic acid, a methacrylic acid, an itaconic acid, a fumaric acid, and a maleic acid, ]

[0052] Although especially the glass transition point of a high molecular compound (D) used for this invention is not limited, viewpoints, such as membrane formation nature and the flexibility of

the record medium obtained, to a glass transition point has desirable  $-50$ – $150$  degrees C, and  $-50$ – $30$  degrees C is desirable from a viewpoint of the flexibility grant to the record medium generally obtained. However, when thinking as important the flexibility of an ink jet record medium and the transparency of an ink absorption layer desirable [  $30$ – $130$  ] and acquired when thinking as important the ink absorptivity of the ink jet record medium obtained when using the giant-molecule emulsion of this invention for ink jet record-medium manufacture, a glass transition point's  $-50$ – $30$  degrees C are desirable. Moreover, when using the giant-molecule emulsion of this invention for thermal recording medium manufacture, viewpoints, such as welding to an electrothermal recording head, to a glass transition point has desirable  $80$ – $150$  degrees C. Although especially a limit does not have the rate that a high molecular compound (D) is contained in the giant-molecule emulsion solid content of this invention, the hydrophilic property of a high molecular compound (A) and the viewpoint of the viscosity change effectiveness manifestation produced by hydrophobic change to below 70 mass % is desirable, and below 40 mass % is still more desirable.

[0053] It is desirable that the giant-molecule emulsion of this invention contains a carbonyl group from the paint film reinforcement and the waterproof viewpoint of a coating layer of the record medium obtained. A high molecular compound (A) can also be made to be able to contain a carbonyl group, a particle (B) can also be made to be able to contain it, and a high molecular compound (D) can also be made to contain it further. The high molecular compound (A) containing a carbonyl group uses the submonomer (N) containing the monomer containing a carbonyl group, and/or is obtained by using keto radical content polyvinyl alcohol. The submonomer (N) containing the main monomer (M) and the monomer containing a carbonyl group can also be respectively used combining one sort or two sorts or more of things. The content of the submonomer (N) containing the carbonyl group content monomer in a high molecular compound (A) is decided in the range where the high molecular compound obtained presents temperature responsibility.

[0054] Although especially the content of the carbonyl group content monomeric unit in a high molecular compound (A) is not restricted, 0.01 – 50 mass % is 0.1 – 20 mass % desirable still more preferably from a viewpoint of film production nature. When a particle (B) consists of an organic high molecular compound, the particle (B) containing a carbonyl group copolymerizes the monomer for obtaining the particle in the case of being the above-mentioned organic high molecular compound (B), and the monomer containing a carbonyl group, and is obtained. The monomer for obtaining the particle in the case of being the above-mentioned organic high molecular compound (B) and the monomer containing a carbonyl group can also be respectively used combining one sort or two sorts or more of things. Although especially the content of the carbonyl group content monomeric unit in a particle (B) is not restricted, 0.01 – 50 mass % is 0.1 – 20 mass % desirable still more preferably from a viewpoint of film production nature.

[0055] The high molecular compound (D) containing a carbonyl group copolymerizes the monomer for obtaining the above-mentioned high molecular compound (D), and the monomer containing a carbonyl group, and is obtained. The monomer for obtaining the above-mentioned high molecular compound (D) and the monomer containing a carbonyl group can also be respectively used combining one sort or two sorts or more of things. Although especially the content of the carbonyl group content monomeric unit in a high molecular compound (D) is not restricted, 0.01 – 50 mass % is 0.1 – 20 mass % desirable still more preferably from a viewpoint of film production nature.

[0056] Although it will not be restricted especially if it has the structure containing a keto radical or the Aldo radical and is in a monomer as a carbonyl group content monomer An acrolein, diacetone acrylamide, die acetone methacrylamide, Formyl styrol, a vinyl methyl ketone, a vinyl ethyl ketone, a vinyl isobutyl ketone, Acrylic oxy-alkyl PUROPANARU and metacryloxy alkyl pro panhard Diacetone acrylate, diacetone methacrylate, acetonitrile acrylate, 2-hydroxypropyl AKURIRETOA cetyl acetate, butanediol acrylate acetyl acetate, etc. are illustrated.

[0057] When the giant-molecule emulsion of this invention contains a carbonyl group, it is desirable to use the hydrazine derivative which has at least two hydrazine radicals and/or a semicarbazide radical as a cross linking agent for the coating liquid used for detail-paper

manufacture from viewpoints, such as the water resisting property of the paint film obtained, and reinforcement. The coating layer containing the compound in which a carbonyl group part has the molecular structure over which the bridge was constructed with the hydrazine derivative can be obtained by adding and mixing in the coating liquid containing the giant-molecule emulsion of this invention, and applying and drying this hydrazine derivative in it. Although it will not be limited especially if it is with the compound which has at least two hydrazine radicals and/or a semicarbazide radical as a hydrazine derivative. As a compound which has a hydrazine radical, among these KARUBO hydrazide, Isophthalic acid dihydrazide, malonic-acid dihydrazide, amber acid dihydrazide, Glutaric-acid dihydrazide, adipic-acid dihydrazide, sebacic-acid dihydrazide, Maleic-acid dihydrazide, fumaric-acid dihydrazide, itaconic-acid dihydrazide, Polyacrylic acid hydrazide, ethylene-1,2-dihydrazine, propene-1,3-dihydrazine, Butylene-1,4-dihydrazine, a hydration hydrazine, etc. are illustrated and the product obtained by the reaction of the poly isocyanate compound and this hydrazine compound as a compound which has a semicarbazide radical is illustrated. As this hydrazine derivative, the compound which has a semicarbazide radical has the highly desirable water resisting property of the record medium obtained. Molar quantity is preferably used 0.01 to 10 times to the carbonyl group content monomeric unit in the giant-molecule emulsion obtained although especially the content of this hydrazine derivative was not limited.

[0058] A temperature-sensitive point can be reduced by adding alcohols, such as ethyl alcohol, to the giant-molecule emulsion of this invention. That is, when a temperature-sensitive point is beyond a room temperature, alcohols can be added, a high molecular compound (A) can be maintained at the condition of an emulsion at the temperature near a room temperature, the giant-molecule emulsion containing a high molecular compound (A) can be conveyed very easily and economically, and it is desirable. Although there is especially no limit as alcohols, and ethyl alcohol, methyl alcohol, n-propyl alcohol, n-butyl alcohol, isopropyl alcohol, n-pentyl alcohol, n-hexyl alcohol, etc. are mentioned, methyl alcohol, ethyl alcohol, and isopropyl alcohol are preferably used from the field of effectiveness. These alcohols can also be used independently and can also be used combining two or more kinds. As for the addition of alcohols, in the case of ethanol, it is usually desirable to the water 100 mass section in a giant-molecule emulsion 5 mass sections thru/or to carry out 200 mass sections addition.

[0059] this invention -- setting -- the object for record media -- invention of coating liquid (said 5) -7 is also offered. As for the coating liquid of this invention, it is desirable to prepare and use it at temperature higher than the temperature-sensitive point of a high molecular compound (A) or the giant-molecule emulsion of this invention. That is, although the coating liquid of this invention is hypoviscosity comparatively at temperature higher than this temperature-sensitive point, this coating liquid is rapidly thickened by cooling this coating liquid to the temperature below this temperature-sensitive point (or gelation). This thickening is produced when a high molecular compound (A) changes from hydrophobicity to a hydrophilic property. That is, by cooling the coating liquid of this invention to the temperature below a temperature-sensitive point promptly after coating on a base material at temperature higher than this temperature-sensitive point, it can be possible to fix the very smooth and homogeneous coating film comparatively formed with the coating liquid of hypoviscosity as it is by subsequent thickening (or gelation), the homogeneity of a good surface state and a paint film can be held also in a desiccation process, and a good coating layer can be obtained.

[0060] It is desirable to make a particle (C) contain in the coating liquid of this invention from a viewpoint of the ink absorptivity of the record medium obtained. A particle (C) may be an organic compound and may be an inorganic compound. The radical polymerization in the inside of an aqueous medium when a particle (C) is an organic compound, The conventionally well-known Pori (meta) acrylate system obtained by anionic polymerization, cationic polymerization, etc., A polyvinyl acetate system, vinyl acetate-acrylic, an ethylene vinyl acetate system, A silicone system, a poly-butadiene system, a styrene butadiene system, an NBR system, A polyvinyl chloride system, a chlorination polypropylene system, a polyethylene system, a polystyrene system, Copolymers, such as a vinylidene-chloride system, a polystyrene-(meta) acrylate system, and a styrene-maleic-anhydride system, Three-dimensions bridge formation resin etc. is

mentioned, denaturation copolymers, such as silicone denaturation acrylic, fluorine-acrylic, acrylic silicon, and epoxy-acrylic, are also contained, and these kinds or two sorts or more can be contained. Here, it writes an acrylate (meta) system [ a methacrylate system (or methacrylate system) or an acrylate system ] simple. The organic high molecular compound especially classified into a Pori (meta) acrylate system (acrylic high molecular compound) and/or a polystyrene-(meta) acrylate system (styrene-acrylic high molecular compound) is preferably used from viewpoints, such as the transparency of the ink absorption layer finally obtained, and light-proof xanthochroism, the shelf life of the record medium obtained.

[0061] As for the particle in the case of being an organic high molecular compound (C), being obtained as a giant-molecule emulsion is desirable. It is obtained by using the manufacturing technology of a giant-molecule emulsion known widely. Specifically Dissolve the above-mentioned surfactant in an aqueous solvent, and it is made to add and emulsify the monomer component mentioned later. The approach of supplying the above-mentioned copolymerization component and a radical polymerization initiator to the system of reaction at the system of reaction by approaches, such as continuation dropping besides [ which adds a radical polymerization initiator and performs an emulsion polymerization by the reaction by package preparation ] an approach, and division addition, is mentioned.

[0062] As a monomer for obtaining the particle in the case of being an organic high molecular compound (C), it can use combining one sort or two sorts or more of things of an ethylene nature partial saturation monomer. Acrylic ester (meta), an acrylamide (meta) system monomer, and vinylcyanides are specifically mentioned. As an example of acrylic ester (meta) The carbon number of the alkyl section The acrylic-acid (meta) alkyl ester of 1-18, The carbon number of the alkyl section The acrylic-acid (meta) hydroxyalkyl ester of 1-18, The number of ethyleneoxide radicals 1-100 oxyethylene (Pori) (meta) acrylate, The number of 1-100 oxypropylene (Pori) (meta) acrylate and ethyleneoxide radicals is mentioned [ 1-100 oxy-(Pori) ECHIRENJI (meta) acrylate etc. ] for the number of propylene oxide radicals. The carbon number of the alkyl section is mentioned for a methyl acrylate (meta), an ethyl acrylate (meta), acrylic-acid (meta) n-butyl, 2-ethylhexyl acrylate (meta), acrylic-acid (meta) cyclohexyl, acrylic-acid (meta) methylcyclohexyl, acrylic-acid (meta) dodecyl, etc. as an example of the acrylic-acid (meta) alkyl ester of 1-18. The carbon number of the alkyl section is mentioned for acrylic-acid (meta) 2-hydroxyethyl, 2-hydroxypropyl acrylate (meta), acrylic-acid (meta) 2-hydroxy cyclohexyl, acrylic-acid (meta) dodecyl, etc. as an example of the acrylic-acid (meta) hydroxyalkyl ester of 1-18. The number of ethyleneoxide radicals is mentioned for acrylic-acid (meta) ethylene glycol, methoxy (meta) acrylic-acid ethylene glycol, an acrylic-acid (meta) diethylene glycol, a methoxy (meta) acrylic-acid diethylene glycol, acrylic-acid (meta) tetraethylene glycol, methoxy (meta) acrylic-acid tetraethylene glycol, etc. as an example of 1-100 oxyethylene (Pori) (meta) acrylate. The number of propylene oxide radicals is mentioned for acrylic-acid (meta) propylene glycol, methoxy (meta) acrylic-acid propylene glycol, acrylic-acid (meta) dipropylene glycol, methoxy (meta) acrylic-acid dipropylene glycol, an acrylic-acid (meta) tetrapropylene glycol, a methoxy (meta) acrylic-acid tetrapropylene glycol, etc. as an example of 1-100 oxypropylene (Pori) (meta) acrylate. The number of ethyleneoxide radicals is mentioned for JI (meta) acrylic-acid ethylene glycol, a JI (meta) acrylic-acid diethylene glycol, a methoxy (meta) acrylic-acid diethylene glycol, JI (meta) acrylic-acid tetraethylene glycol, etc. as an example of 1-100 oxy-(Pori) ECHIRENJI (meta) acrylate. (Meta) As acrylamide system monomers, there are acrylamide, N-methylol (meta) acrylamide, N-butoxy methyl (meta) acrylamide, diacetone acrylamide, etc., for example (meta), and there is acrylonitrile etc. as vinylcyanides, for example (meta). As examples other than the above, for example Moreover, olefins, such as ethylene, a propylene, and an isobutylene Halo olefins, such as dienes, such as a butadiene, a vinyl chloride, and a vinylidene chloride Vinyl acetate, propionic-acid vinyl, n-butanoic acid vinyl, benzoic-acid vinyl, P-tert-butylbenzoic acid vinyl, vinyl pivalate, 2-ethylhexanoic acid vinyl, Carboxylic-acid vinyl ester, such as BASA tic acid vinyl and lauric-acid vinyl Carboxylic-acid isopropenyl ester, such as isopropenyl acetate and propionic-acid isopropenyl Vinyl ether, such as ethyl vinyl ether, isobutyl vinyl ether, and cyclohexyl vinyl ether Aromatic series vinyl compounds, such as styrene derivatives, such as styrene and methyl

styrene, and vinyltoluene, Allyl ester, such as an acetic-acid allyl compound and allyl benzoate, allyl compound ethyl ether, Allyl compound ether, such as allyl glycidyl ether and allyl compound phenyl ether, Furthermore, gamma-(meta) acryloxypropyltrimethoxysilane, vinylmethyldiethoxysilane, Vinylmethyldimethoxysilane, a vinyl dimethylethoxy silane, vinyldimethylmethoxysilane, Vinyltrimetoxysilane, vinyltriethoxysilane, 4-(meth)acryloyloxy - 2, 2, 6, and 6-tetramethylpiperidine, 4-(meth)acryloyloxy - 1, 2, 2, 6, and 6-pentamethylpiperidine, Perfluoro methyl (meta) acrylate, perfluoro propyl (meta) acrylate, Perfluoro PUROPIRO methyl (meta) Acrylate, vinyl pyrrolidone, TORIMECHIRORU pro pantry (meta) acrylate, metaglycidyl acrylate (meta), An acrylic acid 2, 3-cyclohexene oxide, an acrylic-acid (meta) allyl compound, (Meta) Methacrylic-acid acid phosphooxy ethyl, methacrylic-acid 3-chloro-2-acid phosphooxy propyl, methyl propane sulfonic-acid acrylamide, a divinylbenzene, etc. are mentioned. Here, it writes an acrylic [ a meta-acrylic (or methacrylic) or an acrylic ] (meta) simple.

[0063] Although especially a limit does not have the glass transition point of the particle in the case of being an organic high molecular compound (C), the viewpoint of membrane formation nature to a glass transition point has desirable -50-150 degrees C, and -50-30 degrees C is desirable from a viewpoint of the flexibility grant to the record medium generally obtained. However, when thinking as important the flexibility of an ink jet record medium and the transparency of an ink absorption layer desirable [ 30-130 ] and acquired when thinking as important the ink absorptivity of the ink jet record medium obtained when using the giant-molecule emulsion of this invention for ink jet record-medium manufacture, a glass transition point's -50-30 degrees C are desirable.

[0064] Precipitated calcium carbonate when a particle (C) is an inorganic compound, Whiting, a magnesium carbonate, a kaolin, clay, talc, A calcium sulfate, a barium sulfate, a titanium dioxide, a zinc oxide, zinc hydroxide, Zinc sulfide, zinc carbonate, a hydrotalcite, aluminum silicate, diatomaceous earth, A calcium silicate, a magnesium silicate, synthetic amorphous silica, colloidal silica, A dry type silica, an alumina, a colloidal alumina, a pseudo-boehmite system alumina, An aluminum hydroxide, a zeolite, a magnesium hydroxide, other zirconiums, Metallic oxides, such as titanium, a tantalum, niobium, tin, and a tungsten, Metallic phosphate, such as aluminum, vanadium, a zirconium, and a tungsten, etc. is mentioned, and the object which permuted these some inorganic compounds by other elements, and the object which reformed the front face by embellishing with the organic substance can also be used. One kind in these inorganic particle may be used independently, and two or more kinds can also be used.

[0065] It is desirable to use colloidal silica and a dry type silica especially as a particle (C). By using colloidal silica and a dry type silica, the image quality when printing to the record medium obtained can improve, and gloss can be given. It is not limited especially as colloidal silica, but the cationic colloidal silica obtained by the approach of reacting polyvalent metal compounds, such as usual anionic colloidal silica and aluminum ion, is used. Although not limited especially as a dry type silica, the gaseous-phase method silica compounded by burning with hydrogen and oxygen in tetrachlorosilane is used preferably. The object which could use as it is and embellished the front face with the silane coupling agent etc. is sufficient as a dry-process silica.

[0066] Moreover, in ink jet record-medium manufacture, it is desirable to use alumina sol and a pseudo-boehmite system alumina particle as a particle (C). By using alumina sol and a pseudo-boehmite system alumina particle, the image quality when printing to the ink jet record medium obtained can improve, and the water resisting property of an image can be given. The particle (C) used for this invention may be used with a primary particle, and where an aggregated particle is formed, it can also be used. Moreover, although the particle diameter of a particle (C) can use anythings, in order to obtain a record medium with a smooth front face, a thing 10 micrometers or less is used for number average particle diameter, and a thing 1 micrometer or less is usually used preferably. Furthermore, on the occasion of manufacture of an ink jet record medium, optical density (depth of shade) of the printing section after printing is made high, a particle (C) 200nm or less is preferably used for the number average particle diameter of a primary particle in the purpose which acquires the gloss also similar to a film photo, a thing 100nm or less is more preferably used for number average particle diameter, and a thing 50nm or less is used still

more preferably.

[0067] Although especially the minimum of the particle diameter of a particle (C) is not limited, it is desirable that it is the number average particle diameter of about 3nm or more from a viewpoint of the manufacture effectiveness of a particle (C). The number average particle diameter said here is number average particle diameter measured by dynamic light scattering. Furthermore, the process which is made to carry out the mixed reaction of the source of a (a) metal, a template, and the water as a particle (C), using a metallic oxide and/or its precursor as a source of a metal, and manufactures complex, It is manufactured through the process which removes a template from (b) this complex. It is desirable that the difference (SB-SL) of the conversion specific surface area SL for which it asked from the number average particle diameter DL measured by dynamic light scattering, and the nitrogen adsorption specific surface area SB by the BET adsorption method uses the porous matter more than 250m<sup>2</sup>/g especially from a viewpoint of the ink absorptivity of the coating layer obtained. "Porosity" means that pore is shown in the pore distribution searched for with the nitrogen adsorption process here. Here, it assumes that the conversion specific surface area SL (m<sup>2</sup>/g) calculated from the mean particle diameter DL measured by dynamic light scattering has a spherical particle, and asks by  $SL=6 \times 10^3 / \text{consistency (g / cm}^3) \times DL \text{ (nm)}$ . That the difference (SB-SL) of this value and the nitrogen adsorption specific surface area SB by the BET adsorption method is more than 250m<sup>2</sup>/g shows that a particle is porosity very much, and it is desirable from a viewpoint of ink absorptivity. [ of especially the thing for which this porous matter is used for ink jet record-medium manufacture ]

[0068] Although the particle diameter of this porous matter can use anythings, in order to obtain a record medium with a smooth front face, a thing 10 micrometers or less is used for DL, and a thing 1 micrometer or less is usually used preferably. Furthermore, on the occasion of manufacture of an ink jet record medium, optical density (depth of shade) of the printing section after printing is made high, a particle (C) 300nm or less is preferably used for DL in the purpose which acquires the gloss also similar to a film photo, and a thing 150nm or less is used more preferably.

[0069] Although especially the minimum of the particle diameter of this porous matter is not limited, it is desirable that it is the number average particle diameter of about 10nm or more from a viewpoint of the manufacture effectiveness of this porous matter. The sources of a metal used by composition of this porous matter are a metallic oxide and/or its precursor, and eight groups' iron, such as five groups' Lanthanum and vanadium, such as four groups' titanium, such as aluminum of alkaline earth metals, such as silicon, two groups' magnesium, and calcium, zinc, and three groups, a gallium, and rare earth, and a zirconium, seven groups' manganese, and a tellurium, cobalt, etc. are mentioned as a metal kind. As a precursor, although organic metal salts, such as organic-acid salts, such as mineral salt, such as a nitrate of these metals and a hydrochloride, acetate, and naphthenate, and alkylaluminum, an alkoxide, and a hydroxide are mentioned, if compoundable by the synthetic approach of mentioning later, it will not be limited to this.

[0070] When silicon is chosen as a metal, alkoxides and active silica, such as a tetra-ethoxy silane, can be used preferably as a source of a metal. An organic solvent can extract this active silica from water glass, or it can carry out the ion exchange of the water glass, and can be prepared. It is desirable from a viewpoint of industrial use to use water glass cheap as a raw material. When contacting water glass to H<sup>+</sup> mold cation exchanger and preparing it especially, there are few Na contents and it is industrially desirable to use cheap No. 3 water glass. As a cation exchanger, although the strong acid nature exchange resin (for example, made in Iomax & Haas, Amberlite IR-120B: trade name) of a sulfonated polystyrene divinylbenzene system etc. is desirable, it is not limited to especially this, for example. When aluminum is chosen as a metal, ammonium, ulmin acid guanidine, etc. can be used for ulmin acid alkali and a concrete target preferably as a source of a metal a sodium aluminate, potassium aluminate, an ulmin acid lithium, and for a start [ ulmin acid ].

[0071] If it has the compound and interaction used as the source of a metal as this template, although there is especially no limit, when using a nonionic surfactant and manufacturing this porous matter, it can remove a template easily using the mixed solvent of water or water, and an

organic solvent in the template removal process mentioned later, and is desirable.

[0072] As a nonionic surfactant, the thing shown by structure-expression  $\text{HO}(\text{C}_2\text{H}_4\text{O})_a\text{--}(\text{C}_3\text{H}_6\text{O})_b\text{--}(\text{C}_2\text{H}_4\text{O})_c\text{H}$  (however, 10-110b show 30-70 in a and c) or the thing shown by structure-expression  $\text{R}(\text{OCH}_2\text{CH}_2)_n\text{OH}$  (however, R shows the alkyl group of carbon numbers 12-20, and n shows 2-30) is desirable. Specifically, "Pluronic P103", "Pluronic P123", "Pluronic P85" (the Asahi Denka Kogyo [ K.K. ] make, a surface active agent: trade name), etc. the polyoxyethylene lauryl ether, the polyoxyethylene cetyl ether, polyoxyethylene stearyl ether, etc. can be mentioned.

[0073] In order to change the pore diameter of this porous matter, the aromatic hydrocarbon of carbon numbers 6-20, the alicyclic hydrocarbon of carbon numbers 5-20, the aliphatic hydrocarbon of carbon numbers 3-16, these amines and a halogenation object, for example, toluene, trimethyl benzene, triisopropyl benzene, etc. can be added as an organic assistant.

[0074] Below, the manufacture approach of this porous matter is explained. Although the reaction of the source of a metal and a template can be made to perform after it carries out churning mixing of what dissolved or distributed for example, the source of a metal to the solvent, and the thing which dissolved or distributed the template to the solvent, it is not limited to this. As a solvent, although any of the mixed solvent of water or water, and an organic solvent may be used, as an organic solvent, alcohols are desirable. As alcohols, lower alcohol, such as ethanol and a methanol, is desirable.

[0075] Although the presentation used for these reactions changes with a template, the source of a metal, and solvents, it needs to choose the range where condensation, precipitate, etc. arise and particle diameter does not become large. in order [ moreover, ] to prevent condensation and precipitate of a particle -- alkali, such as NaOH, and low-molecular -- stabilizing agents, such as PVA, may be added. For example, as a source of a metal, when using "Pluronic P103" as a template and using water for active silica as a solvent, the following presentations can be used. P103/SiO<sub>2</sub> as a mass ratio -- desirable -- 0.01-30 -- the range of 0.1-5 is used more preferably. an organic assistant / mass ratio of P103 -- desirable -- 0.02-100 -- it is 0.05-35 more preferably. as the water of reaction time / mass ratio of P103 -- desirable -- 10-1000 -- the range of 20-500 is used more preferably. As a stabilizing agent, NaOH may be added in  $1 \times 10^{-4}$ -0.15 as a mass ratio of NaOH/SiO<sub>2</sub>.

[0076] When this porous matter contains silicon and aluminum, it is 0.003-0.1 preferably as an element ratio of aluminum/Si, and is 0.005-0.05 more preferably. although a reaction advances easily also in ordinary temperature -- the need -- responding -- warming to 100 degrees C -- it can also carry out in the bottom. As reaction time, the range of 3 - 50 hours is used preferably for 0.5 to 100 hours. pH of reaction time -- desirable -- 2-13 -- it is the range of 4-12 more preferably, and acids, such as alkali, such as NaOH, and a hydrochloric acid, a sulfuric acid, may be added for control of pH.

[0077] After manufacturing this complex, it can heat at 40-95 degrees C under ulmin acid alkali coexistence, and the process which denaturalizes can also be performed. When complex contains silicon, by performing this process, even if it makes it acidity or adds the cationic matter, it is stable, and the sol which is equal also to prolonged preservation can be manufactured. As ulmin acid alkali to be used, although ammonium, ulmin acid guanidine, etc. can be used a sodium aluminate, potassium aluminate, an ulmin acid lithium, and for a start [ ulmin acid ], a sodium aluminate is desirable. This denaturation process may be the back before removing a template from complex.

[0078] Below, the denaturation approach is explained to an example for the case before template removal. After manufacturing complex, an ulmin acid alkali solution is added in the reaction solution. 0-80 degrees C of addition are performed preferably, agitating at 5-40 degrees C. Although especially the concentration of the ulmin acid alkali to add is not limited, it is desirable to use by 1 - 20 mass %. The amounts to add are 0.003-0.1 preferably as an element ratio of aluminum/Si, and are 0.005-0.05 more preferably. After addition, it is desirable to heat at 40-95 degrees C, and it is more desirable to heat at 60-80 degrees C. When heating of 40 degrees C or less creates a sol and it is made acidity, it is easy to gel it, and sufficient stability is not acquired.



[0079] Next, the removal approach of a template is explained. The porous matter is obtained by adding solvents, such as alcohol, to the obtained reaction solution, and removing a template from complex using an ultrafilter etc. in order [ under the present circumstances, ] to prevent condensation of a particle — alkali, such as NaOH, and low-molecular — stabilizing agents, such as PVA, may be added. The solvent used for removal is easy handling, and its high alcohols of solvent power are [ that what is necessary is just what dissolves a template ] desirable. As alcohols, lower alcohol, such as a methanol and ethanol, is desirable. Although removal temperature changes with the solvents and templates to be used, its 20–80 degrees C are desirable. The removed template is reusable by removing a solvent. Moreover, the porous matter may be obtained by contacting the template which carries out a \*\* exception by filtration etc., rinses, dries and subsequently contains the obtained complex to solvents, such as supercritical fluid and alcohol, or removing it by approaches, such as baking. Burning temperature is performed in general above 500 degrees C beyond the temperature to which a template disappears. Although firing time is suitably set up by relation with temperature, it is 30 minutes – about 6 hours. As the removal approach, the approach of carrying out churning mixing of a solvent and the complex and complex can be put in a column etc., and the approach of circulating a solvent can be taken.

[0080] In this invention, invention of the manufacture approach (said 8) of a record medium is also offered. In carrying out coating of the coating liquid of this invention to a base material at temperature (that is, a high molecular compound (A) hydrophobic temperature) higher than the temperature-sensitive point of a high molecular compound (A) or the high molecular compound of this invention It compares with the case where other water soluble polymers, such as polyvinyl alcohol, are used instead of the giant-molecule emulsion of the case where this coating liquid carries out coating to a base material at the temperature below this temperature-sensitive point (that is, a high molecular compound (A) temperature of a hydrophilic property), or this invention. This coating liquid is hypoviscosity more and can obtain more high-concentration coating liquid. That is, it is possible to be able to save time amount and energy required for desiccation, and to obtain a record medium more economically. Furthermore, the voidage of the coating layer obtained when carrying out coating of the coating liquid of temperature higher than the temperature-sensitive point of a high molecular compound (A) to a base material is high, and it is useful, especially when ink absorptivity becomes good and it uses as an ink jet record medium. Although this reason is not clear, a giant-molecule emulsion is formed by hydrophobing of the high molecular compound (A) being carried out in coating liquid, and since it is rare to invade all over a minute opening effective in ink absorption, and to fill an opening, it is being surmised that good ink absorptivity will be able to be discovered.

[0081] Although the coating liquid of this invention is hypoviscosity comparatively at temperature higher than the temperature-sensitive point of a high molecular compound (A) or the giant-molecule emulsion of this invention, this coating liquid is rapidly thickened by cooling this coating liquid to the temperature below this temperature-sensitive point (or gelation). This thickening is produced when a high molecular compound (A) changes from hydrophobicity to a hydrophilic property. That is, by cooling the coating liquid of this invention to the temperature below this temperature-sensitive point promptly after coating on a base material at temperature higher than this temperature-sensitive point, it can be possible to fix the very smooth and homogeneous coating film comparatively formed with the coating liquid of hypoviscosity as it is by subsequent thickening (or gelation), the homogeneity of a good surface state and a paint film can be held also in a desiccation process, and a good coating layer can be obtained.

[0082] Moreover, as for the cooling temperature after coating, it is desirable to lower 5 degrees C or more rather than this temperature-sensitive point from a viewpoint of the membrane formation nature of the coating layer obtained and transparency, and it is more desirable to lower 10 more degrees C or more. It is desirable to perform desiccation by warm air after the process which cools this coating liquid to the temperature after coating and below this temperature-sensitive point on a base material at temperature higher than this temperature-sensitive point. It can dry efficiently by spraying warm air to a coating side strongly. Although the cause was unknown, it was found out that a crack with the membrane formation nature of the



coating layer obtained, so that a rate of drying is quick minute good etc. stops being able to enter easily. The above-mentioned effectiveness is preferably discovered on conditions which desiccation ends substantially within 5 minutes after the process which cools this coating liquid to the temperature after coating and below a temperature-sensitive point on a base material at temperature higher than a temperature-sensitive point especially. The coating layer which has better ink absorptivity in ink jet record-medium manufacture is obtained. Here, it says setting dealing with this record medium in as general the interior of a room as "desiccation is completed substantially", and becoming below the moisture content of extent held by equilibrium.

[0083] Furthermore, as compared with the record medium obtained when having not emulsion-ized (i.e., when the high molecular compound (A) forms condensation or a big and rough lump into record-medium coating liquid), the record medium obtained using this record-medium coating liquid when the high molecular compound (A) used for this invention forms the giant-molecule emulsion into the coating liquid in front of coating can obtain the paint film of a more homogeneous and good coating layer, and is desirable. When the high molecular compound (A) forms the emulsion into the coating liquid in front of coating, the record medium obtained using this coating liquid It compares with the record medium obtained using the coating liquid containing the emulsion which consists of a high molecular compound (a hydrophilic property and hydrophobicity do not change) which does not have temperature responsibility instead of this emulsion containing a high molecular compound (A). The good record medium which the crack on the front face of a record medium could not enter easily, and was excellent in surface smooth nature etc. is obtained.

[0084] Although especially the solvent used for the coating liquid for record media of this invention is not limited, water soluble solvents, such as alcohol, a ketone, and ester, and/or water are used preferably. Furthermore, into this coating liquid, a pigment agent, a thickener, a flow regulator, a defoaming agent, foam suppressor, a release agent, a foaming agent, a coloring agent, etc. can be blended if needed. That one of sorts [ them ] is also colloidal silica including the giant-molecule emulsion of this invention and at least two or more sorts of particles (C) has the desirable coating liquid for record media of this invention. Membrane formation nature improves by containing colloidal silica. As colloidal silica, the colloidal silica of the configuration which connected and/or branched usual spherical colloidal silica and in the shape of a rosary etc. is illustrated, and the colloidal silica of the configuration which connected and/or branched in the shape of a rosary is used preferably.

[0085] It is desirable in order for not only membrane formation nature but ink absorptivity to improve, when the colloidal silica of the configuration which set to this invention, and connected and/or branched in the shape of a rosary as a particle (C) is used. the thing which has the long-chain structure which spherical colloidal silica connected with the colloidal silica of the configuration which connected and/or branched in the shape of a rosary in the shape of a rosary, and the thing to which the connected silica branched -- or it is crooked, for example, the metal ion more than divalent can be made for the primary particle of a spherical silica to be able to intervene, between a particle-particle can be combined, and it can obtain. Although this especially colloidal silica magnitude is not limited, that [ its ] whose number average particle diameter measured by dynamic light scattering is 20-400nm is desirable, and what is 20-200nm is used more preferably. Specifically, "the Snow tex UP", the "Snow tex OUP", "Snow tex PS-M", the "Snow tex PSL", "Snow tex PS-S", "Snow tex PS-SO" (Nissan Chemical Industries, Ltd. make), etc. are illustrated.

[0086] Although especially the diameter of a primary particle of the colloidal silica used for this invention is not limited, that whose mean particle diameter measured by the BET adsorption method is 4-100nm is used preferably. Although especially the amount of the colloidal silica used of this invention is not limited, to the (Particle C) 100 mass sections other than colloidal silica, the 1 - 900 mass section is used preferably, and the 5 - 200 mass section is used more preferably.

[0087] That one of sorts [ them ] is also a dry type silica including the giant-molecule emulsion of this invention and at least two or more sorts of particles (C) has the desirable coating liquid for record media of this invention. Ink absorptivity improves by containing a dry type silica.

Although not limited especially as a dry type silica used for this invention, the gaseous-phase method silica compounded by burning with hydrogen and oxygen in tetrachlorosilane, methyltrichlorosilane, trichlorosilane, etc. is used preferably. Specifically, "Aerosil" (the product made from Japanese Aerosil: trade name), "Reolosil" (Tokuyama Make: trade name), etc. are illustrated. A dry-process silica may be used as it is, and the thing which made a part of what embellished the front face with the silane coupling agent etc., oxidation aluminum, etc. contain may be used.

[0088] Although especially the diameter of a primary particle of the dry type silica used for this invention is not limited, that whose mean particle diameter measured by the BET adsorption method is 4-50nm is used preferably. Although especially the amount of the dry type silica used of this invention is not limited, to the (Particle C) 100 mass sections other than a dry type silica, the 1 - 900 mass section is used preferably, and the 5 - 200 mass section is used more preferably. Although especially the content in a coating layer of the giant-molecule emulsion of this invention is not limited, in each coating layer which the giant-molecule emulsion of this invention contains, especially the thing whose 5-40 mass % content it is desirable containing below 60 mass % from a viewpoint of ink absorptivity, and it does [ in / more than 5 mass % of the total solids of this coating layer is desirable, and / an ink jet record medium ] from a viewpoint of film production nature is desirable.

[0089] Since still better membrane formation nature is given in this invention, water soluble resin (E) can be used together with the giant-molecule emulsion of this invention in a coating layer. Although not limited especially as water soluble resin (E), cellulotics, such as polyvinyl alcohol derivatives, such as polyvinyl alcohol, cation conversion polyvinyl alcohol, and silanol denaturation polyvinyl alcohol, a polyvinyl pyrrolidone, polyacrylamides, starch and the derivative of starch, a carboxymethyl cellulose, and hydroxyethyl cellulose, casein, gelatin, etc. are illustrated, and polyvinyl alcohol derivatives, such as polyvinyl alcohol, cation conversion polyvinyl alcohol, and silanol denaturation polyvinyl alcohol, are used more preferably. As for the content of this water soluble resin (E), it is desirable to carry out 1-200 mass section content from the effectiveness of this invention and a viewpoint of ink absorptivity to the giant-molecule emulsion 100 mass section of this invention, and especially its thing to do for 5-30 mass section content is desirable.

[0090] this invention -- if it is, other organic binders can also be used together. For example, polyvinyl acetate, polyacetals, polyurethane, polyvinyl butyrals, the Pori (meta) acrylic acids (ester), polyamides, polyester resin, a urea-resin, melamine resin, etc. are raised. In this invention, it is desirable that at least one-layer ink absorption layer contains a cationic polymer (F) on the occasion of ink jet record-medium manufacture. The water resisting property of the printing section improves by containing a cationic polymer (F). Although it will not be limited especially if cationicity is shown as this cationic polymer (F), the thing containing at least one sort of a primary amine, a secondary amine, tertiary-amine substituents and these salts, and a quarternary-ammonium-salt substituent is used preferably. For example, a dimethyl diaryl ammoniumchloride polymerization object, a dimethyl diaryl ammoniumchloride-acrylamide copolymerization object, an alkylamine polymerization object, a polyamine cyanogen polymerization object, the poly allylamine hydrochloride, etc. are raised. Although especially the molecular weight of this cationic polymer (F) is not limited, the object of weight average molecular weight 1,000-200,000 is used preferably. Although especially the amount of the cationic polymer (F) used is not limited, to the giant-molecule emulsion 100 mass section, from a waterproof viewpoint of a paint film, the 0.1 - 200 mass section is desirable, and the 10 - 100 mass section is used more preferably. Furthermore, use of the cationic polymer (F) which has only the 4th class ammonium substituent from a viewpoint of the degree of fading [ which is produced when printed matter is put to sunlight or the light of a fluorescent lamp ] is desirable.

[0091] In this invention, it is desirable that at least one-layer coating layer contains an ultraviolet ray absorbent, a hindered amine light stabiliser, a singlet oxygen quencher, and an antioxidant on the occasion of ink jet record-medium manufacture. The lightfastness of the printing section improves by containing this matter. Although not limited especially as an ultraviolet ray absorbent, a benzotriazol system, a benzophenone system, titanium oxide, cerium

oxide, a zinc oxide, etc. are used preferably. Although not limited especially as a hindered amine light stabiliser, that whose N atom of a piperidine ring is N-R (R is a hydrogen atom, an alkyl group, benzyl, an allyl group, an acetyl group, an alkoxy group, a cyclohexyl radical, a benzyloxy radical, etc.) is used preferably. Although not limited especially as a singlet oxygen quencher, an aniline derivative, an organic nickel system, a SUPIRO chroman system, and a SUPIRO in out system are used preferably. Although not limited especially as an antioxidant, a phenol system, a hydroquinone system, an organic sulfur system, the Lynn system, and an amine system are used preferably. The amount of this matter used has desirable 0.0001 – 20 mass section to this ink absorption layer 100 mass section in the ink absorption layer containing this matter.

[0092] In this invention, it is desirable that at least one-layer ink absorption layer contains an alkaline-earth-metal compound on the occasion of ink jet record-medium manufacture.

Lightfastness improves by containing an alkaline-earth-metal compound. As an alkaline earth metal compound, the oxide of magnesium, calcium, and barium, a halogenide, and a hydroxide are used preferably. Especially the method of making an ink absorption layer contain an alkaline-earth-metal compound is not limited. You may add in coating liquid and the water solution of an alkaline-earth-metal compound may be made to \*\*\*\* in this ink absorption layer after forming an ink absorption layer. The content of an alkaline-earth-metal compound has desirable 0.5 – 20 mass section in the ink absorption layer containing an alkaline-earth-metal compound at oxide conversion to the solid content 100 mass section in this ink absorption layer. In this invention, a gloss layer can be prepared in the outermost layer. Although not limited especially as a means to prepare a gloss layer, the approach of making diameter pigments of an ultrafine particle, such as colloidal silica and/or a dry type silica, containing, the supercalender method, the gloss calender method, the cast method, etc. are used.

[0093] In this invention, a record medium (said 9) and invention of 10 are also offered. When manufacturing the medium for record in this invention, as a base material used, polyester film, resin covering paper, coat paper, paper, etc. are used preferably, for example, but it will not be limited especially if it is the base material which can prepare coating layers, such as glass, aluminium foil, cloth, a nonwoven fabric, vacuum evaporation paper, and a vacuum evaporation film. In this invention, polyester film and resin covering paper are used especially preferably. The polyester which is made to carry out the polycondensation of aromatic series dicarboxylic acid, such as a terephthalic acid, isophthalic acid, and naphthalene dicarboxylic acid, or the ester of those, and the polyhydric alcohol, such as ethylene glycol, a diethylene glycol, 1,4-butanediol, and neopentyl glycol, to polyester film, and is obtained is film-ized, and orientation processing is usually carried out by processing of roll extension, tenter extension, inflation extension, etc. in many cases. Although what copolymerized other components is mentioned to polyethylene terephthalate, polyethylene butylene terephthalate, polyethylene -2, 6-naphthalate, and these as an example of polyester, this invention is not limited to these.

[0094] As covering resin used for resin covering paper, polyolefin resin is desirable and especially polyethylene resin is desirable. The resin layer of the so-called melting extrusion coating method which casts the polyolefin resin which carried out heating fusion as an approach of forming a covering resin layer in in the paper [ Hara ] it runs, or resin covering paper can be formed by the approach of coating an emulsion with film organization potency etc. Moreover, after coating the stencil paper for resin covering papers with an emulsion with the minimum membrane formation temperature (MFT) higher than a room temperature, it can be formed also by overheating to the temperature beyond the minimum membrane formation temperature.

[0095] According to the application, as for the field (front face) where the coating layer of a base material is applied, it has a glossy surface, a mat side, etc., and especially a glossy surface is used preferably. It is more desirable to carry out resin covering from the point of curl prevention, although it is not necessary to necessarily cover resin at the rear face. In the resin of resin covering paper, white pigments, such as titanium oxide, a zinc oxide, talc, and a calcium carbonate, Fatty-acid amides, such as octadecanamide and an arachidic acid amide, zinc stearate, Fatty-acid metal salts, such as calcium stearate, aluminum stearate, and magnesium stearate, The antioxidant of IRUGA NOx 1010 and IRUGA NOx 1076 grade, Blue pigments and colors, such as cobalt blue, ultramarine blue, sicilian blue, and a copper phthalocyanine blue, It

can add combining suitably various kinds of additives, such as a pigment of Magentas, such as cobalt violet, fast violet, and manganese purple, a color, a fluorescent brightener, and an ultraviolet ray absorbent.

[0096] Especially a limit does not have the stencil paper used for resin covering paper, and the paper generally used can be used for it. as the pulp which constitutes stencil paper -- natural pulp, playback pulp, a synthetic pulp, etc. -- one sort -- or two or more sorts are mixed and it is used. Additives, such as the sizing compound generally used of paper manufacture, a paper reinforcing agent, a loading material, an antistatic agent, a fluorescent brightener, and a color, are blended with this stencil paper. Furthermore, surface spreading of a surface sizing compound, a surface paper durability agent, a fluorescent brightener, an antistatic agent, a color, the anchoring agent, etc. may be carried out.

[0097] Moreover, the good thing of surface smooth nature of the stencil paper for resin covering papers carried out [ compress / during paper milling or after paper milling / a pressure / in a calender etc. / impress and ] is desirable, and especially the thing for 200 seconds or more has Beck's desirable smoothness measured by JIS-P -8119. Moreover, the basis weight has desirable 30 - 250 g/m<sup>2</sup>. The coating liquid of this invention can form a coating layer with high transparency usable as a record medium of which optical translucency, such as an OHP film, is required. In the record medium of which optical translucency, such as an OHP film, is required, the presentation of a coating layer and not only light transmission nature but the optical property of a base material is important. In order to obtain a record medium with optical high transparency, it is desirable that the haze (haze value) by JIS-K -7105 uses 3.0 or less transparence base material, and 1.0 or less transparence base material is more desirable.

[0098] Moreover, as for the haze of the record medium at the time of using it as an OHP film, in the record medium which prepared the coating layer on the base material, it is desirable that the haze (haze value) by JIS-K -7105 of this record medium is 5.0 or less. Although especially the thickness of the base material used for an OHP film is not restricted, an about 30-200-micrometer thing is desirable from the \*\*\*\* fitness of a printer. In this invention, when using a film and resin covering paper as a base material, it is desirable to perform this support surface that performs coating in advance of coating for corona discharge treatment, flame treatment, UV irradiation processing, plasma treatment, etc.

[0099] On a base material, an under coat may be prepared for the purpose of raising the adhesive property of Hazama of a gaseous-phase method silica content layer and a base material, or adjusting electric resistance. When using a film and resin covering paper especially as a base material, it is desirable to prepare an under coat on the field in which a coating layer is prepared. For example, high molecular compounds, such as acrylic resin, polyester resin, a vinylidene chloride, vinyl chloride resin, vinyl acetate resin, polystyrene, polyamide resin, polyurethane resin, and gelatin, are mentioned, and you can make it add as an under coat, combining a cross linking agent, a pigment, a surfactant, etc. suitably. moreover, the coating of an under coat -- facing -- this high molecular compound -- solvents, such as water and an organic solvent, -- melting -- it can also use -- moreover, the gestalt of an emulsion -- also using -- it can do. The thickness of an under coat is 0.01-5-micrometer (desiccation thickness) on a base material preferably.

[0100] Various kinds of back coat layers can be painted on the base material in this invention for antistatic nature, conveyance nature, curl tightness, note nature, sizing nature, etc. A back coat layer can be made to add combining suitably an inorganic antistatic agent, an organic antistatic agent, a hydrophilic binder, a latex, a cross linking agent, a pigment, lubricant, a surfactant, etc. It is the case where it uses by OHP etc., and when preparing a recording layer only in one side of a base material, an antireflection film can also be prepared in the front face of the opposite side, or its both sides in order to raise light transmission nature.

[0101] The coating layer of this invention may be prepared only in one side of a base material, is the purpose of controlling deformation of double-sided record or curl, and may be prepared in both sides of a base material. As for the manufacturing installation by this invention, it is desirable that it is the manufacturing installation which comes to contain a means to carry out coating of the coating liquid which contains the giant-molecule emulsion of this invention at least

on a base material at temperature higher than the temperature-sensitive point of this giant-molecule emulsion, a means to cool a coating layer to the temperature below a temperature-sensitive point promptly after coating, and a means to dry a coating layer.

[0102] As a means which carries out coating, various equipments, such as various blade coating machines, a roll coater, an air knife coating machine, a bar coating machine, a rod blade coating machine, a curtain flow coater, a gate roll coater, a short dwell coating machine, an extrusion die coating machine, size press, and a spray, can be used by the on-machine or the off-machine on a base material. It is possible to set to make two or more coating layers form on a base material, and to perform coincidence multilayer coating. Coincidence multilayer coating can be performed by the coating approach which used for example, the extrusion die coating machine and the curtain flow coater. An extrusion die coating machine is more desirable in order to avoid that two or more coating layers mix thru/or unite. When using an extrusion die coating machine, just before moving on the delivery neighborhood of an extrusion die coating machine, i.e., a base material, laminating formation is carried out, and multilayer coating of two or more coating liquid breathed out by coincidence is carried out on a base material in the condition. In case this coincidence multilayer coating is performed, in order to avoid mixing of two or more coating liquid, barrier layer solution (interlayer liquid) can be made to be able to intervene between a coating layer and a coating layer, and can also carry out coincidence coating. This barrier layer solution is preferably used in the liquid which has thixotropy nature, although it can choose without a limit especially if it is hard to mix with an up-and-down coating layer. As a liquid used preferably, the water solution of polymers, such as hydroxypropyl methylcellulose, methyl cellulose, hydroxyethyl methyl cellulose, a polyvinyl pyrrolidone, and gelatin, is mentioned.

[0103] As a means to make a coating layer cool, well-known means, such as a cold blast machine, a blower, and a refrigerator, can be used. A cold blast machine is used preferably, it changes with the temperature-sensitive points of the giant-molecule emulsion of this invention variously, and the temperature below this temperature-sensitive point is desirable, and it is [ the temperature low 5 degrees C or more of the temperature of cold blast is more desirable, and ] still more desirable than a temperature-sensitive point. [ of temperature lower 10 degrees C or more than a temperature-sensitive point ] As a means to dry a coating layer, well-known desiccation means, such as hot air drying equipment, a steamy fired dryer, and a far-infrared dryer, can be used. Hot air drying equipment is used preferably and a drum dryer, an air cap dryer, an air foil dryer, air conveyor dryers, and such combination are mentioned. Although drying temperature changes with the classes of dryer variously, 50-200 degrees C of temperature inside a dryer are 100-150 degrees C preferably.

[0104] Thus, as for the record medium of manufactured this invention, it is desirable that the amount of coating of said ink absorbing layer is 5 - 50 g/m<sup>2</sup> in solid content conversion, and it is still more desirable that it is 10 - 40 g/m<sup>2</sup>. As compared with the case where the amount of coating does not prepare an ink absorbing layer in less than two 10 g/m, it is ineffective in respect of the color enhancement of a color, and there is a possibility that the powder omission of an ink absorbing layer may occur, in 40 g/m<sup>2</sup> \*\*. In addition, as thickness of the whole coating layer, 5-50 micrometers is desirable and 10-40 micrometers is still more desirable.

[0105] The record medium of this invention is useful to the record using the ink constituent containing water soluble dye, an oil color, a watercolor pigment, an oily pigment, etc. Record by writing materials, such as an ink jet recording method which prints by breathing out the minute drop of an ink constituent, for example, and making an ink constituent adhere to a record-medium front face as a method of this record, thermal recording which prints by making an ink constituent color with heating, gravure, other offset-printing and various printing methods, and a pen, etc. is mentioned, and especially the record medium of this invention is preferably used for printing by the ink jet recording method. That is, in case a record medium also with the manufacture approach of the manufacture approach of the giant-molecule emulsion of this invention and the giant-molecule emulsion of this invention and the coating liquid for record media of this invention, and the record medium of this invention desirable to record by the above-mentioned recording method and printing is manufactured, it is useful, and it is useful to especially manufacture of an ink jet record medium. Furthermore, it is hypoviscosity at

temperature higher than the temperature-sensitive point of a high molecular compound (A), and since the giant-molecule emulsion of this invention shows the thickening nature which was extremely excellent in below the temperature-sensitive point at the time of cooling, it is useful in the viscosity control agent by temperature control, an aqueosity thickener, various paper coating applications, the coatings for paint, etc., and useful in especially the coatings for spray painting. [0106] Although an example etc. is used below and this invention is invented still more concretely below, this invention is not limited at all by these examples etc. The section in an example and especially % mean mass section and mass % except what was indicated. The measuring method of various physical properties used into an example is as follows. the number average particle diameter by dynamic light scattering — the product made from Otsuka Electron — it measured using ELS-800. Pore distribution, pore volume, and specific surface area were measured with nitrogen using auto SOBU -1 made from can TAKUROMU. Pore volume distribution was computed by the BJH method. It asked for specific surface area with the BET adsorption method. The powder X-ray-analysis Fig. measured using RINT2500 made from physical science.

[0107] The temperature-sensitive point of the high molecular compound in the giant-molecule emulsion of this invention (A) was searched for when reducing gradually the temperature of this giant-molecule emulsion that adjusted the concentration of a high molecular compound (A) to 5 mass % by aqueous intermediation, maintaining the temperature beyond polymerization temperature, and this liquid measured the rarefaction or the temperature to gel. Evaluation of a printing property used yellow, a Magenta, cyanogen, black, Green, red, and the thing that performed blue solid printing using the commercial ink jet printer (Seiko Epson PM-800C).

[0108] Evaluation criteria were as having been shown below, the evaluation result was performed by ten-step evaluation, and as a result of being very good, 4 and an inferior result were set to 2 and it set [ 10 and a good result / 8 and a little good result ] the extremely inferior result to 1 for 6 and a little inferior result. Furthermore, in ink absorptivity evaluation, membrane formation nature was bad and the result which was not able to print was described that measurement is impossible.

(1) Ink absorptivity : immediately after the blot after printing, and printing, the printing section was pressed down in the blank paper and it judged with extent of an ink imprint.

(2) Membrane formation nature : the visual judgment of the crack of the coating film, surface smooth nature, and the adhesion condition was carried out.

(3) Transparency : the visual judgment of the transparency of the coating film was carried out.

(4) Coating film water resisting property : waterdrop was hung down to the coating film and the water resisting property was judged sensuously.

[0109]

[The example 1 of reference] The water 45 section was supplied to the reaction container furnished with a stirrer, a reflux condenser, driptank, and a thermometer, and the inside of a reaction container was made into 80 degrees C. Next, the 25% water-solution 0.3 of "ADEKA rear soap SE1025N" (the Asahi Denka Kogyo [ K.K. ] make, a surfactant: trade name) section and the 2% water-solution 0.5 section of ammonium persulfate were added. After the 5 minutes, the methyl-methacrylate 2 section, the butyl acrylate 2 section, the acrylic-acid 1 section, The 25% water-solution 0.8 section of "ADEKA rear soap SE1025N", and the thing which used the 2% water-solution 1 of ammonium persulfate section, and the water 10 section as pre emulsified liquid with the homogenizer, the N-isopropyl acrylamide 40 section and polyvinyl alcohol (whenever [ saponification ] — 99-mol % —) A degree of polymerization 1700, Kuraray Make, Kuraray poval PVA117: Addition was respectively started for the liquid which dissolved the trade name 1.5 section in the water 160 section in the reaction container, and addition was terminated over 4 hours. After keeping the solution temperature in a reaction container at 80 degrees C, the binder (a) in which the emulsion 16% of resin solid content and whose number average particle diameter in 50 degrees C are 130nm was formed was obtained by saving at 50 degrees C for after [ addition-during addition termination ] 1 hour. When the temperature-sensitive point was measured, it was 30 degrees C.

[0110]

[The example 2 of reference] The water 45 section was supplied to the reaction container furnished with a stirrer, a reflux condenser, driptank, and a thermometer, and the inside of a reaction container was made into 80 degrees C. Next, the 25% water-solution 0.3 of "ADEKA rear soap SE1025N" (the Asahi Denka Kogyo [ K.K. ] make, a surfactant: trade name) section and the 2% water-solution 0.5 section of ammonium persulfate were added. After the 5 minutes, the methyl-methacrylate 2 section, the butyl acrylate 2 section, the acrylic-acid 1 section, The 25% water-solution 0.8 section of "ADEKA rear soap SE1025N", and the thing which used the 2% water-solution 1 of ammonium persulfate section, and the water 10 section as pre emulsified liquid with the homogenizer, Addition was respectively started for the liquid which dissolved the N-isopropyl acrylamide 40 section and the polyvinyl alcohol (whenever [ saponification ] 88-mol % and degree of polymerization 300, Kuraray Make, Kuraray poval PVA203: trade name) 5 section in the water 160 section in the reaction container, and addition was terminated over 4 hours. After keeping the solution temperature in a reaction container at 80 degrees C, the binder (b) in which the emulsion 16% of resin solid content and whose number average particle size in 50 degrees C are 100nm was formed was obtained by saving at 50 degrees C for after [ addition-during addition termination ] 1 hour. When the temperature-sensitive point was measured, it was 30 degrees C.

[0111]

[The example 3 of reference] The water 45 section was supplied to the reaction container furnished with a stirrer, a reflux condenser, driptank, and a thermometer, and the inside of a reaction container was made into 80 degrees C. Next, the 25% water-solution 0.3 of "ADEKA rear soap SE1025N" (the Asahi Denka Kogyo [ K.K. ] make, a surfactant: trade name) section and the 2% water-solution 0.5 section of ammonium persulfate were added. After the 5 minutes, the methyl-methacrylate 2 section, the butyl acrylate 2 section, the 25% water-solution 0.8 section of "ADEKA rear soap SE1025N", What used the 2% water-solution 1 of ammonium persulfate section, and the water 10 section as pre emulsified liquid with the homogenizer, Addition was respectively started for the liquid which dissolved the N-isopropyl acrylamide 40 section and the silanol denaturation polyvinyl alcohol (Kuraray Make Kuraray R polymer R1130: trade name) 1.5 section in the water 160 section in the reaction container, and addition was terminated over 4 hours. After keeping the solution temperature in a reaction container at 80 degrees C, the binder (c) in which the emulsion 16% of resin solid content and whose number average particle size in 50 degrees C are 120nm was formed was obtained by saving at 50 degrees C for after [ addition-during addition termination ] 1 hour. When the temperature-sensitive point was measured, it was 30 degrees C.

[0112]

[The example 4 of reference] The water 45 section was supplied to the reaction container furnished with a stirrer, a reflux condenser, driptank, and a thermometer, and the inside of a reaction container was made into 80 degrees C. Next, the 25% water-solution 0.3 of "ADEKA rear soap SE1025N" (the Asahi Denka Kogyo [ K.K. ] make, a surfactant: trade name) section and the 2% water-solution 0.5 section of ammonium persulfate were added. After the 5 minutes, the methyl-methacrylate 2 section, the butyl acrylate 2 section, the acrylic-acid 1 section, The 25% water-solution 0.8 section of "ADEKA rear soap SE1025N", and the thing which used the 2% water-solution 1 of ammonium persulfate section, and the water 10 section as pre emulsified liquid with the homogenizer, Addition was respectively started for the liquid which dissolved the N-isopropyl acrylamide 40 section and the keto radical content polyvinyl alcohol (Unitika [, Ltd. ] make D polymer D-500: trade name) 1.5 section in the water 160 section in the reaction container, and addition was terminated over 4 hours. After keeping the solution temperature in a reaction container at 80 degrees C, the binder (d) in which the emulsion 16% of resin solid content and whose number average particle size in 50 degrees C are 100nm was formed was obtained by saving at 50 degrees C for after [ addition-during addition termination ] 1 hour. When the temperature-sensitive point was measured, it was 30 degrees C.

[0113]

[The example 5 of reference] The water 360 section was supplied to the reaction container furnished with a stirrer, a reflux condenser, driptank, and a thermometer, and the inside of a



reaction container was made into 80 degrees C. Next, the 25% water-solution 25 section of "Kohtamin 86W" (the Kao [ Corp. ] make, a cationic surfactant: trade name), the 70% water-solution 7.5 section of "emulgen 1135S-70" (the Kao [ Corp. ] make, a nonionic surfactant: trade name), and the 70% water-solution 4 section of the 4th class salt of a N,N-dimethylaminopropyl acrylamide methyl chloride were added in this reactor. It added continuously, having supplied the 5% water-solution 8 of 2 and 2'-azobis (2-methyl propione amidine) NI base acid chloride section in this reactor furthermore, and having covered the liquid which mixed the methyl-methacrylate 9 section, the butyl acrylate 9 section, the styrene 9 section, the diacetone acrylamide 2 section, and the 2-hydroxy ethyl methacrylate 2 section after the 5 minutes in this reactor for 30 minutes. Addition was performed keeping the inside of a reaction container at 80 degrees C. The number average particle diameter of the emulsion in this phase was 11nm. In the water 1254 section, then, the N-isopropyl acrylamide 290 section, polyvinyl alcohol (whenever [ saponification ] — 88-mol % and polymerization degree 3500, and Kuraray Make —) Kuraray poval PVA235 : The trade name 5 section, the diacetone acrylamide 10 section, The 70% water-solution 5 section of the 4th class salt of a N,N-dimethylaminopropyl acrylamide methyl chloride, the 25% water-solution 10 section of "Kohtamin 86W", and "BUREMMA QA" (the Nippon Oil & Fats Co., Ltd. make —) Cationic reaction-type surface active agent: Addition initiation of the liquid which dissolved the 5% water-solution 11 of 25% water-solution 15 section [ of a trade name ] and 2, and 2'-azobis (2-methyl propione amidine) NI base acid chloride section was carried out into this reaction container, and addition was terminated over 4 hours. After keeping under addition, and after [ addition termination ] 1 hour, and the solution temperature in a reaction container at 80 degrees C, it cooled to 50 degrees C and the 60% water-solution 1000 of ethanol section was gradually added in this reaction container. The binder (e) in which the emulsion 11% of resin solid content and whose number average particle diameter are 120nm was formed was obtained by cooling to the after [ addition termination ] room temperature of an ethanol water solution. When the temperature-sensitive point was measured, it was 31 degrees C.

[0114]

[The example 6 of reference] The 12% water dispersion 500 of "Snow tech PS-SO" (the Nissan Chemical Industries [ , Ltd. ] make, rosary-like colloidal silica: trade name) section and the 25% water-solution 4 section of "ADEKA rear soap SE1025N" were supplied to the reaction container furnished with a stirrer, a reflux condenser, driptank, and a thermometer, and the inside of a reaction container was made into 80 degrees C. Addition initiation of the mixed liquor of the 2% water-solution 10 section of ammonium persulfate, the N-isopropyl acrylamide 140 section, the polyvinyl alcohol (whenever [ saponification ] 88-mol % and degree of polymerization 3500, Kuraray Make, Kuraray poval PVA235: trade name) 2 section, and the water 600 section was carried out into this reaction container from driptank, and addition was terminated over 4 hours. After keeping the solution temperature in a reaction container at 80 degrees C, the binder (f) in which the emulsion 16% of resin solid content and whose number average particle diameter are 140nm was formed was obtained by saving at 50 degrees C for after [ addition-during addition termination ] 1 hour. When the temperature-sensitive point was measured, it was 32 degrees C.

[0115]

[The example 7 of reference] The water 200 section was supplied to the reaction container furnished with a stirrer, a reflux condenser, driptank, and a thermometer, and the inside of a reaction container was made into 80 degrees C. Next, the 25% water-solution 20 section of "Kohtamin 86W" (the Kao [ Corp. ] make, a cationic surfactant: trade name), the 70% water-solution 15 section of "emulgen 1135S-70" (the Kao [ Corp. ] make, a nonionic surfactant: trade name), and the 70% water-solution 10 section of the 4th class salt of a N,N-dimethylaminopropyl acrylamide methyl chloride were added in this reactor. It added continuously, having supplied the 5% water-solution 15 of 2 and 2'-azobis (2-methyl propione amidine) NI base acid chloride section in this reactor furthermore, and having covered the liquid which mixed the methyl-methacrylate 25 section, the butyl acrylate 25 section, the styrene 15 section, and the 2-hydroxy ethyl methacrylate 1 section after the 5 minutes in this reactor for 1 hour. Addition was performed keeping the inside of a reaction container at 80 degrees C. The number average



particle diameter of the emulsion in this phase was 70nm. then, the water 380 section -- the N-isopropyl acrylamide 70 section and polyvinyl alcohol (whenever [ saponification ] -- 99-mol % -- ) A degree of polymerization 1700, Kuraray Make, Kuraray poval PVA117 : The trade name 1 section, Addition initiation of the liquid which dissolved the 5% water-solution 11 of 25% water-solution 15 section [ Of "BUREMMA QA" (the Nippon Oil & Fats / Co., Ltd. / make, a cationic reaction-type surface active agent: trade name) ] and 2, and 2'-azobis (2-methyl propione amidine) NI base acid chloride section is carried out into this reaction container. Addition was terminated over 4 hours. After keeping the solution temperature in a reaction container at 80 degrees C, the binder (g) in which the emulsion 16% of resin solid content and whose number average particle diameter are 120nm was formed was obtained by saving at 50 degrees C for after [ addition-during addition termination ] 1 hour. When the temperature-sensitive point was measured, it was 32 degrees C.

[0116]

[The example 8 of reference] The water 300 section was supplied to the reaction container furnished with a stirrer, a reflux condenser, driptank, and a thermometer, and the inside of a reaction container was made into 80 degrees C. Next, the 25% water-solution 25 section of "Kohtamin 24W" (the Kao [ Corp. ] make, a cationic surfactant: trade name), the 70% water-solution 7 section of "emulgen 1135S-70" (the Kao [ Corp. ] make, a nonionic surfactant: trade name), and the 70% water-solution 4 section of the 4th class salt of a N,N-dimethylaminopropyl acrylamide methyl chloride were added in this reactor. It added continuously, having supplied the 5% water-solution 8 of 2 and 2'-azobis (2-methyl propione amidine) NI base acid chloride section in this reactor furthermore, and having covered the liquid which mixed the methyl-methacrylate 10 section, the methacrylic-acid butyl 10 section, the styrene 10 section, and the 2-hydroxy ethyl methacrylate 2 section after the 5 minutes in this reactor for 30 minutes. Addition was performed keeping the inside of a reaction container at 80 degrees C. The number average particle diameter of the emulsion in this phase was 16nm. In the water 200 section, then, the N-isopropyl acrylamide 40 section, the 70% water-solution 1 section of the 4th class salt of a N,N-dimethylaminopropyl acrylamide methyl chloride, polyvinyl alcohol (whenever [ saponification ] -- 99-mol % and polymerization degree 1700, and Kuraray Make --) Kuraray poval PVA117 : The trade name 1 section, the diacetone acrylamide 2 section, Addition initiation of the liquid which dissolved the 5% water-solution 4 of methylenebis acrylamide 0.1 section, 25% water-solution 3 section [ of "Kohtamin 86W" ] and 2, and 2'-azobis (2-methyl propione amidine) NI base acid chloride section was carried out into this reaction container, and addition was terminated over 4 hours. Furthermore, it continues. In the water 200 section The acrylamide 38 section, the 70% water-solution 1 section of the 4th class salt of a N,N-dimethylaminopropyl acrylamide methyl chloride, The 2-hydroxy ethyl methacrylate 4 section, the diacetone acrylamide 2 section, Addition initiation of the liquid which dissolved the 5% water-solution 4 of methylenebis acrylamide 0.1 section, 25% water-solution 3 section [ of "Kohtamin 86W" ] and 2, and 2'-azobis (2-methyl propione amidine) NI base acid chloride section was carried out into this reaction container, and addition was terminated over 4 hours. After keeping the solution temperature in a reaction container at 80 degrees C, the binder (h) in which the emulsion 14% of resin solid content and whose number average particle diameter are 120nm was formed was obtained by saving at 50 degrees C for after [ addition-during addition termination ] 1 hour. When the temperature-sensitive point was measured, it was 30 degrees C.

[0117]

[The example 9 of reference] The water 360 section was supplied to the reaction container furnished with a stirrer, a reflux condenser, driptank, and a thermometer, and the inside of a reaction container was made into 80 degrees C. Next, the 25% water-solution 25 section of "Kohtamin 86W" (the Kao [ Corp. ] make, a cationic surfactant: trade name), the 70% water-solution 7.5 section of "emulgen 1135S-70" (the Kao [ Corp. ] make, a nonionic surfactant: trade name), and the 70% water-solution 4 section of the 4th class salt of a N,N-dimethylaminopropyl acrylamide methyl chloride were added in this reactor. It added continuously, having supplied the 5% water-solution 8 of 2 and 2'-azobis (2-methyl propione amidine) NI base acid chloride section in this reactor furthermore, and having covered the liquid which mixed the methyl-methacrylate

9 section, the butyl acrylate 9 section, the styrene 9 section, the diacetone acrylamide 2 section, and the 2-hydroxy ethyl methacrylate 2 section after the 5 minutes in this reactor for 30 minutes. Addition was performed keeping the inside of a reaction container at 80 degrees C. The number average particle diameter of the emulsion in this phase was 11nm. In the water 1254 section, then, the N-isopropyl acrylamide 290 section, The diacetone acrylamide 10 section, the 70% water-solution 10 section of the 4th class salt of a N,N-dimethylaminopropyl acrylamide methyl chloride, polyvinyl alcohol (whenever [ saponification ] -- 99-mol % and polymerization degree 1700, and Kuraray Make --) Kuraray poval PVA117 : The trade name 5 section, the methacrylic-acid 0.5 section, the 25% water-solution 10 section of "Kohtamin 86W", and "BUREMMA QA" (the Nippon Oil & Fats Co., Ltd. make --) Cationic reaction-type surface active agent: Addition initiation of the liquid which dissolved the 5% water-solution 11 of 25% water-solution 15 section [ of a trade name ] and 2, and 2'-azobis (2-methyl propione amidine) NI base acid chloride section was carried out into this reaction container, and addition was terminated over 4 hours. After keeping under addition, and after [ addition termination ] 1 hour, and the solution temperature in a reaction container at 80 degrees C, it cooled to 50 degrees C and the 60% water-solution 1000 of ethanol section was gradually added in this reaction container. The binder (i) in which the emulsion 11% of resin solid content and whose number average particle diameter are 110nm was formed was obtained by cooling to the after [ addition termination ] room temperature of an ethanol water solution. When the temperature-sensitive point was measured, it was 30 degrees C.

[0118]

[The example 10 of reference] The water 212 section and the 25% water-solution 1 section of "ADEKA rear soap SE1025N" were supplied to the reaction container furnished with a stirrer, a reflux condenser, driptank, and a thermometer, and the inside of a reaction container was made into 80 degrees C. Next, the acrylic-acid 2 section, the diacetone acrylamide 2 section, the methyl-methacrylate 51 section, the butyl acrylate 5 section, and the 2-hydroxy ethyl methacrylate 1 section were mixed, and into this monomer mixed liquor, the mixed liquor of the 25% water-solution 10 of "ADEKA rear soap SE1025N" section and the 2% water-solution 10 section of ammonium persulfate was used as pre emulsified liquid with the homogenizer, and it added over 2 hours into the reaction container from driptank. After addition during addition was completed, the temperature in a reaction container was kept at 80 degrees C for further 1 hour. The number average particle diameter of the emulsion in this phase was 10nm. Then, addition initiation of the mixed liquor of the 2% water-solution 10 section of ammonium persulfate, the N-isopropyl acrylamide 140 section, and the water 600 section was carried out into this reaction container from driptank, and addition was terminated over 2.5 hours. After keeping under addition, and after [ addition termination ] 1 hour, and the solution temperature in a reaction container at 80 degrees C, it cooled to 50 degrees C and the 60% water-solution 780 of ethanol section was gradually added in this reaction container. The binder (j) in which the emulsion 11% of resin solid content and whose number average particle diameter are 100nm was formed was obtained by cooling to the after [ addition termination ] room temperature of an ethanol water solution. When the temperature-sensitive point was measured, it was 31 degrees C.

[0119]

[The example 11 of reference] The water 600 section and the 28% water-solution 40 section of "Kohtamin 86W", and the 70% water-solution 6 section of the 4th class salt of a N,N-dimethylaminopropyl acrylamide methyl chloride were supplied to the reaction container furnished with a stirrer, a reflux condenser, driptank, and a thermometer, and the inside of a reaction container was made into 70 degrees C. Next, the addition liquid which mixed the diacetone acrylamide 4 section, the styrene 128 section, the methyl-methacrylate 80 section, and the methacrylic-acid butyl 66 section (1), In the water 100 section, the 28% water-solution 9 section of "Kohtamin 86W", the 70% water-solution 1 section of "emulgen 1135S-70", The addition liquid (2) which dissolved the 70% water-solution 6 of the 5% water-solution 45 section of - azobis (2-methyl propione amidine) NI base acid chloride and the 4th class salt of 2 and 2' aminoethyl methacrylate methyl chloride section was respectively added over 4 hours into the reaction container from driptank. After addition during addition was completed and keeping the

temperature in a reaction container at 70 degrees C for further 2 hours, it cooled to the room temperature. The binder (k) in which the emulsion with 30% [ of resin solid content ] and a number average particle diameter of 40nm was formed was obtained. Although measurement of the temperature-sensitive point was tried, change judged to be a temperature-sensitive point was not produced.

[0120]

[The example 12 of reference] It dissolved in the mixed solvent 130 section of 1:1 (mass ratio) of ethylene glycol methyl ether acetate and trimethyl phosphate, and the <example of composition of poly semicarbazide compound (PSC)> hexamethylene di-isocyanate 168 section and the water 1.5 section as a biuret-ized agent were made to react with the reaction temperature of 160 degrees C for 1 hour. Using the thin film distillation can, excessive hexamethylene di-isocyanate and the 1st solvent were carried out under conditions (133Pa / 160 degrees C), distilling-off recovery of the 2nd obtained reaction mixture was carried out by two steps of processings under conditions (13.3Pa / 200 degrees C), and the residue was obtained. The obtained residue contained the poly isocyanate (BYUU let mold poly isocyanate of hexamethylene di-isocyanate) of 99.9 mass %, and the residual hexamethylene di-isocyanate of 0.1 mass %. 1900(\*\*200) mPa.s / 25 degrees C, and the number average molecular weight of the viscosity of the obtained residue were about 600 (\*\*100), and about 3.3 and -NCO radical content of the number of average-NCO functional groups were 23.3 mass %s.

[0121] After adding at a room temperature over about 30 minutes, agitating the hydrazine 1 hydrate 80 section to the reactor which has a reflux condenser, a thermometer, and churning equipment at the isopropyl alcohol 1000 section, the solution which dissolved the poly isocyanate (NCO radical content 23.3 mass %) 144 above-mentioned section in the tetrahydrofuran 576 section was added over about 1 hour at 10 degrees C, churning was continued at 40 more degrees C for 3 hours, and the water of the 1000 sections was added. Then, the poly semicarbazide compound (PSC) which has the biuret structure of the 168 sections was obtained by distilling off the isopropyl alcohol in the obtained reaction mixture, a hydrazine, a tetrahydrofuran, water, etc. to a scale loss draft. It was 4.6 meq/g when the number of average semicarbazide residue was measured.

[0122]

[The example 13 of reference] It is 100g of water in 100g (made in loam & Haas, Amberlite IR-120B: trade name) of cation exchange resin beforehand used as H<sup>+</sup> mold. To the dispersed inside, the solution which diluted 33.3g (2= SiO<sub>2</sub> 9.5 mass %, O= Na<sub>2</sub> 9.5 mass %) of No. 3 water glass with 66.7g of water is added. After agitating this enough, cation exchange resin was carried out the \*\* exception, and 200g of active silica water solutions was obtained. SiO<sub>2</sub> of this active silica water solution was 5.0 mass %.

[0123] The 60g of the above-mentioned active silica water solutions was added having dissolved Pluronic P103 by the Asahi electrification company of 5g in 1360g of water, and agitating in 35-degree-C water bath. Furthermore, 20ml of NaOH water solutions of 0.015 mol/l is added. pH of this mixture was 7.5. This mixture was put at 80 degrees C, and was made to react after 15-minute churning at 35 degrees C for 24 hours. The nonionic surface active agent was removed from this solution using the ultrafilter, and the dispersion liquid of the transparent porous matter (I) of silica concentration 4 mass % were obtained. The conversion specific surface area of the mean particle diameter measured by the dynamic light scattering of these dispersion liquid was 45m<sup>2</sup>/g in 60nm. BJH of the sample which dried these dispersion liquid at 105 degrees C -- a nitrogen adsorption specific surface area [ according / pore volume / to 1.21 ml/g and a BET adsorption method ] according [ the average pore diameter by law ] to 8nm was 720m<sup>2</sup>/g, and the difference with conversion specific surface area was 675m<sup>2</sup>/g. A peak was not seen in the X diffraction Fig. of this sample.

[0124]

[The example 14 of reference] To the inside which distributed 300g (made in loam & Haas, Amberlite IR-120B: trade name) of cation exchange resin beforehand used as H<sup>+</sup> mold in 300g of water, the solution which diluted 100g (silica =30 mass %, O= Na<sub>2</sub> 9.5 mass %) of No. 3 water glass with 200g of water is added. After agitating this enough, cation exchange resin was carried

out the \*\* exception, and 600g of active silica water solutions was obtained. The silica concentration in this solution was 5%. This was diluted with 1675g of purified water (it is called A liquid). Heating churning was carried out at 60 degrees C for 1 hour after mixing 500g [ of water solutions in which Pluronic P123 of 50g was dissolved ], 200g [ of sodium-hydroxide water solutions of 0.015 mol/l ], and trimethyl benzene 25g apart from this, and transparence liquid was obtained (this is called B liquid). After carrying out dropping mixing of the B liquid at A liquid, 80 degrees C was heated for 24 hours, and the complex solution was obtained. P123 was removed from this solution using the ultrafilter, and the dispersion liquid of the porous matter of about 7.5 mass % were obtained. The dispersion liquid of the porous matter (II) which heated at 80 degrees C in addition for 24 hours so that a sodium-aluminate 1 mass % water solution might be set to 0.01 by making aluminum/Si into an element ratio at this sol liquid, and denaturalized with aluminum were obtained.

[0125] When asked for the mean particle diameter of these dispersion liquid by dynamic light scattering, conversion specific surface area was 15m<sup>2</sup>/g in 195nm. BJH of the sample which dried these dispersion liquid at 105 degrees C -- a nitrogen adsorption specific surface area [ according / pore volume / to 1.67 ml/g and a BET adsorption method ] according [ the average pore diameter by law ] to 18nm was 413m<sup>2</sup>/g, and the difference with conversion specific surface area was 398m<sup>2</sup>/g. A peak was not seen in the X diffraction Fig. of this sample.

[0126]

[Example 1] The porous matter (I) dispersion liquid obtained in the example 13 of reference were heated at 60 degrees C, after adding the binder (a) obtained by this in the example 1 of reference at a rate used as the porous (matter I) / (Binder a) = 100 / 25 (dry mass ratio), it mixed at 60 degrees C and coating liquid was created. After applying said 60-degree C coating liquid to the sheet made from polyethylene terephthalate (100 micrometers in thickness) which performed hydrophilization processing to the front face by the bar coating machine warmed at 60 degrees C, ventilation was promptly started for 10-degree C cold blast on the coating film front face. At this time, the coating film gelled cold blast promptly after ventilation initiation, and has held homogeneous thickness and a smooth front face. After ventilating cold blast for 1 minute, the coating film front face was ventilated in 60-degree C warm air. The coating film was substantially dried by about 8-minute Hazama from warm air ventilation initiation, and the record sheet which prepared the ink absorption layer with a thickness of about 25 micrometers was obtained. The evaluation result of this sheet was shown in Table 1.

[0127]

[Example 2] The record sheet was obtained by the same approach as an example 1 except using the binder (b) obtained in the example 2 of reference instead of the binder (a) of an example 1. The evaluation result of this sheet was shown in Table 1.

[0128]

[Example 3] The record sheet was obtained by the same approach as an example 1 except using the binder (c) obtained in the example 3 of reference instead of the binder (a) of an example 1. The evaluation result of this sheet was shown in Table 1.

[0129]

[Example 4] The binder (d) which heated the porous matter (I) dispersion liquid obtained in the example 13 of reference at 60 degrees C, and was obtained by this in the example 4 of reference. It adds at a rate used as the porous (matter I) / (Binder d) = 100 / 25 (dry mass ratio). After mixing, the adipic-acid dihydrazide (ADH) 5 mass % water solution was mixed at 60 degrees C to this with a rate used as ADH/(Binder d) = 2 / 100 (dry mass ratio), and coating liquid was created to it. After applying said 60-degree C coating liquid to the sheet made from polyethylene terephthalate (100 micrometers in thickness) which performed hydrophilization processing to the front face by the bar coating machine warmed at 60 degrees C, ventilation was promptly started for 10-degree C cold blast on the coating film front face. At this time, the coating film gelled cold blast promptly after ventilation initiation, and has held homogeneous thickness and a smooth front face. After ventilating cold blast for 1 minute, the coating film front face was ventilated in 60-degree C warm air. The coating film was substantially dried by about 8-minute Hazama from warm air ventilation initiation, and the record sheet which prepared the ink absorption layer with

a thickness of about 25 micrometers was obtained. The evaluation result of this sheet was shown in Table 1.

[0130]

[Example 5] After adding to the porous matter (I) dispersion liquid obtained in the example 13 of reference so that it may be set to the porous (matter I) / cationic polymer =100 / 8 (dry mass ratio), they were made to distribute a cationic polymer (Asahi Denka Kogyo [ K.K. ] make polymer ADEKA thio ace DM-20A: trade name) 20 mass % water solution using an ultrasonic disperser. The binder (e) which heated these dispersion liquid at 60 degrees C, and was obtained by this in the example 5 of reference It adds at a rate used as the porous (matter I) / (Binder e) =100 / 25 (dry mass ratio). After mixing, the adipic-acid dihydrazide (ADH) 5 mass % water solution was mixed at 60 degrees C to this with a rate used as ADH/(Binder e) =2 / 100 (dry mass ratio), and coating liquid was created to it. After applying said 60-degree C coating liquid to the sheet made from polyethylene terephthalate (100 micrometers in thickness) which performed hydrophilization processing to the front face by the bar coating machine warmed at 60 degrees C, ventilation was promptly started for 10-degree C cold blast on the coating film front face. At this time, the coating film gelled cold blast promptly after ventilation initiation, and has held homogeneous thickness and a smooth front face. After ventilating cold blast for 1 minute, the coating film front face was ventilated in 60-degree C warm air. The coating film was substantially dried by about 8-minute Hazama from warm air ventilation initiation, and the record sheet which prepared the ink absorption layer with a thickness of about 25 micrometers was obtained. The evaluation result of this sheet was shown in Table 1.

[0131]

[Example 6] The record sheet was obtained by the same approach as an example 1 except using the binder (f) obtained in the example 6 of reference instead of the binder (a) of an example 1. The evaluation result of this sheet was shown in Table 1.

[0132]

[Example 7] After adding to the porous matter (I) dispersion liquid obtained in the example 13 of reference so that it may be set to the porous (matter I) / cationic polymer =100 / 8 (dry mass ratio), they were made to distribute a cationic polymer (Asahi Denka Kogyo [ K.K. ] make polymer ADEKA thio ace DM-20A: trade name) 20 mass % water solution using an ultrasonic disperser. These dispersion liquid were heated at 60 degrees C, the binder (g) obtained by this in the example 7 of reference was mixed at addition and 60 degrees C with a rate used as the porous (matter I) / (Binder g) =100 / 25 (dry mass ratio), and coating liquid was created. After applying said 60-degree C coating liquid to the sheet made from polyethylene terephthalate (100 micrometers in thickness) which performed hydrophilization processing to the front face by the bar coating machine warmed at 60 degrees C, ventilation was promptly started for 10-degree C cold blast on the coating film front face. At this time, the coating film gelled cold blast promptly after ventilation initiation, and has held homogeneous thickness and a smooth front face. After ventilating cold blast for 1 minute, the coating film front face was ventilated in 60-degree C warm air. The coating film was substantially dried by about 8-minute Hazama from warm air ventilation initiation, and the record sheet which prepared the ink absorption layer with a thickness of about 25 micrometers was obtained. The evaluation result of this sheet was shown in Table 1.

[0133]

[Example 8] The record sheet was obtained by the same approach as an example 5 except using the binder (h) obtained in the example 8 of reference instead of the binder (e) of an example 5. The evaluation result of this sheet was shown in Table 1.

[0134]

[Example 9] The record sheet was obtained by the same approach as an example 5 except using the binder (i) obtained in the example 9 of reference instead of the binder (e) of an example 5. The evaluation result of this sheet was shown in Table 1.

[0135]

[Example 10] The record sheet was obtained by the same approach as an example 9 except using the poly semicarbazide compound (PSC) obtained in the example 12 of reference instead

of the adipic-acid dihydrazide (ADH) of an example 9. The evaluation result of this sheet was shown in Table 1.

[0136]

[Example 11] After adding to the porous matter (I) dispersion liquid obtained in the example 13 of reference so that it may be set to the porous (matter I) / cationic polymer =100 / 8 (dry mass ratio), they were made to distribute a cationic polymer (Asahi Denka Kogyo [ K.K. ] make polymer ADEKA thio ace DM-20A: trade name) 20 mass % water solution using an ultrasonic disperser. The binder (i) which heated these dispersion liquid at 60 degrees C, and was obtained by this in the example 9 of reference It adds at a rate used as the porous (matter I) / (Binder i) =100 / 25 (dry mass ratio). After mixing, the adipic-acid dihydrazide (ADH) 5 mass % water solution was mixed at 60 degrees C to this with a rate used as ADH/(Binder i) =2 / 100 (dry mass ratio), and coating liquid was created to it. After applying said 60-degree C coating liquid to the sheet made from polyethylene terephthalate (100 micrometers in thickness) which performed hydrophilization processing to the front face by the bar coating machine warmed at 60 degrees C, ventilation was promptly started for 10-degree C cold blast on the coating film front face. At this time, the coating film gelled cold blast promptly after ventilation initiation, and has held homogeneous thickness and a smooth front face. After ventilating cold blast for 1 minute and carrying out the deferred wind of the 60-degree C warm air to a coating film front face for about 1 minute, the coating film front face was continuously ventilated in 90-degree C warm air. The coating film was substantially dried by about 4-minute Hazama from warm air ventilation initiation, and the record sheet which prepared the ink absorption layer with a thickness of about 25 micrometers was obtained. The evaluation result of this sheet was shown in Table 1.

[0137]

[Example 12] The record sheet was obtained by the same approach as an example 9 except using the porous matter (II) dispersion liquid obtained in the example 14 of reference instead of the porous matter (I) dispersion liquid of an example 9. The evaluation result of this sheet was shown in Table 1.

[0138]

[Example 13] After adding a cationic polymer (Asahi Denka Kogyo [ K.K. ] make polymer ADEKA thio ace DM-20A: trade name) after having added water so that it might become dry type silica (product [ made from Japanese Aerosil ] A300: trade name) with solid content 18 mass %, and making it distribute using ultrasonic disperser 20 mass % water solution so that it may be set to a dry type silica / cationic polymer =100 / 5 (dry mass ratio), it was made to distribute again using an ultrasonic disperser. These dispersion liquid were heated at 60 degrees C, after adding and mixing the binder (i) obtained by this in the example 9 of reference at a rate used as a dry type silica / (Binder i) =100 / 25 (dry mass ratio), the adipic-acid dihydrazide (ADH) 5 mass % water solution was mixed at 60 degrees C to this with a rate used as ADH/(Binder i) =2 / 100 (dry mass ratio), and coating liquid was created to it. After applying said 60-degree C coating liquid to the sheet made from polyethylene terephthalate (100 micrometers in thickness) which performed hydrophilization processing to the front face by the bar coating machine warmed at 60 degrees C, ventilation was promptly started for 10-degree C cold blast on the coating film front face. At this time, the coating film gelled cold blast promptly after ventilation initiation, and has held homogeneous thickness and a smooth front face. After ventilating cold blast for 1 minute, the coating film front face was continuously ventilated in 60-degree C warm air. The coating film was substantially dried by about 8-minute Hazama from warm air ventilation initiation, and the record sheet which prepared the ink absorption layer with a thickness of about 25 micrometers was obtained. The evaluation result of this sheet was shown in Table 1.

[0139]

[Example 14] After adding a cationic polymer (Asahi Denka Kogyo [ K.K. ] make polymer ADEKA thio ace DM-20A: trade name) after having added water so that it might become dry type silica (product [ made from Japanese Aerosil ] A300: trade name) with solid content 18 mass %, and making it distribute using ultrasonic disperser 20 mass % water solution so that it may be set to a dry type silica / cationic polymer =100 / 5 (dry mass ratio), it was made to distribute again using an ultrasonic disperser. On the other hand, after adding to the porous matter (I) dispersion

liquid obtained in the example 13 of reference so that it may be set to the porous (matter I) / cationic polymer =100 / 8 (dry mass ratio), they were made to distribute a cationic polymer (Asahi Denka Kogyo [ K.K. ] make polymer ADEKA thio ace DM-20A: trade name) 20 mass % water solution separately using an ultrasonic disperser. These dry type silica dispersion liquid processed in the cationic polymer, and these porous matter (I) dispersion liquid processed in the cationic polymer After mixing at a rate used as a dry type silica / porous (matter I) =50 / 50 (dry mass ratio), The binder (i) which heated this mixed liquor at 60 degrees C, and was obtained by this in the example 9 of reference It adds at a rate used as (the dry type silica + porosity matter (I)) / (Binder i) =100 / 25 (dry mass ratio). After mixing, the adipic-acid dihydrazide (ADH) 5 mass % water solution was mixed at 60 degrees C to this with a rate used as ADH/(Binder i) =2 / 100 (dry mass ratio), and coating liquid was created to it. After applying said 60-degree C coating liquid to the sheet made from polyethylene terephthalate (100 micrometers in thickness) which performed hydrophilization processing to the front face by the bar coating machine warmed at 60 degrees C, ventilation was promptly started for 10-degree C cold blast on the coating film front face. At this time, the coating film gelled cold blast promptly after ventilation initiation, and has held homogeneous thickness and a smooth front face. After ventilating cold blast for 1 minute, the coating film front face was ventilated in 60-degree C warm air. The coating film was substantially dried by about 8-minute Hazama from warm air ventilation initiation, and the record sheet which prepared the ink absorption layer with a thickness of about 25 micrometers was obtained. The evaluation result of this sheet was shown in Table 1.

[0140]

[Example 15] After adding a cationic polymer (Asahi Denka Kogyo [ K.K. ] make polymer ADEKA thio ace DM-20A: trade name) after having added water so that it might become dry type silica (product [ made from Japanese Aerosil ] A300: trade name) with solid content 18 mass %, and making it distribute using ultrasonic disperser 20 mass % water solution so that it may be set to a dry type silica / cationic polymer =100 / 5 (dry mass ratio), it was made to distribute again using an ultrasonic disperser. These dispersion liquid were heated at 60 degrees C, after adding and mixing the binder (i) obtained by this in the example 9 of reference at a rate used as a dry type silica / (Binder i) =100 / 25 (dry mass ratio), the adipic-acid dihydrazide (ADH) 5 mass % water solution was mixed at 60 degrees C to this with a rate used as ADH/(Binder i) =2 / 100 (dry mass ratio), and coating liquid was created to it. After applying said 60-degree C coating liquid to the sheet made from polyethylene terephthalate (100 micrometers in thickness) which performed hydrophilization processing to the front face by the bar coating machine warmed at 60 degrees C, ventilation was promptly started for 10-degree C cold blast on the coating film front face. At this time, the coating film gelled cold blast promptly after ventilation initiation, and has held homogeneous thickness and a smooth front face. The coating film was substantially dried by about 20-minute Hazama from cold blast ventilation initiation, and the record sheet which prepared the ink absorption layer with a thickness of about 25 micrometers was obtained. The evaluation result of this sheet was shown in Table 1.

[0141]

[Example 16] After adding a cationic polymer (Asahi Denka Kogyo [ K.K. ] make polymer ADEKA thio ace DM-20A: trade name) after having added water so that it might become dry type silica (product [ made from Japanese Aerosil ] A300: trade name) with solid content 18 mass %, and making it distribute using ultrasonic disperser 20 mass % water solution so that it may be set to a dry type silica / cationic polymer =100 / 5 (dry mass ratio), it was made to distribute again using an ultrasonic disperser. These dispersion liquid were heated at 60 degrees C, after adding and mixing the binder (i) obtained by this in the example 9 of reference at a rate used as a dry type silica / (Binder i) =100 / 25 (dry mass ratio), the adipic-acid dihydrazide (ADH) 5 mass % water solution was mixed at 60 degrees C to this with a rate used as ADH/(Binder i) =2 / 100 (dry mass ratio), and coating liquid was created to it. After applying said 60-degree C coating liquid to the sheet made from polyethylene terephthalate (100 micrometers in thickness) which performed hydrophilization processing to the front face by the bar coating machine warmed at 60 degrees C, ventilation initiation of the 60-degree C warm air was promptly carried out on the coating film front face. At this time, as for the coating film, ununiformity-ization of the coating

film which prompt thickening does not have and is called liquid Yori was observed after ventilation. Continuously, the coating film front face was ventilated, the coating film dried 60-degree C warm air substantially by about 10-minute Hazama from warm air ventilation initiation, and the record sheet of an ink absorption layer with an uneven thickness of about 10-15 micrometers was obtained. The evaluation result of this sheet was shown in Table 1.

[0142]

[Example 17] After adding water so that it may become colloidal silica (the Nissan Chemical Industries [ Ltd. ] make, PS-S: trade name) with solid content 12 mass %, it heated at 60 degrees C, and it added at a rate used as a silica / (Binder a) =100 / 25 (dry mass ratio), the binder (a) obtained by this in the example 1 of reference was mixed at 60 degrees C, and coating liquid was created. After applying said 60-degree C coating liquid to the sheet made from polyethylene terephthalate (100 micrometers in thickness) which performed hydrophilization processing to the front face by the bar coating machine warmed at 60 degrees C, ventilation was promptly started for 10-degree C cold blast on the coating film front face. At this time, the coating film gelled cold blast promptly after ventilation initiation, and has held homogeneous thickness and a smooth front face. After ventilating cold blast for 1 minute, the coating film front face was ventilated in 60-degree C warm air. The coating film was substantially dried by about 8-minute Hazama from warm air ventilation initiation, and the record sheet which prepared the ink absorption layer with a thickness of about 25 micrometers was obtained. The evaluation result of this sheet was shown in Table 1.

[0143]

[The example 1 of a comparison] the porous matter (I) dispersion liquid obtained in the example 13 of reference -- 60 degrees C -- heating -- this -- polyvinyl alcohol (Kuraray Make --) Kuraray poval PVA235 : A trade name is added at a rate used as the porous (matter I) / polyvinyl alcohol =100 / 25 (dry mass ratio). After mixing, at a rate used as polyvinyl alcohol / (boric-acid + borax) =20 / 1 (dry mass ratio), it added, the water solution dissolved in this mixed liquor with the mass ratio of boric-acid / borax / water =1/1/18 was mixed in 60 degrees C, and coating liquid was created. After applying said 60-degree C coating liquid to the sheet made from polyethylene terephthalate (100 micrometers in thickness) which performed hydrophilization processing to the front face by the bar coating machine warmed at 60 degrees C, ventilation was promptly started for 10-degree C cold blast on the coating film front face. At this time, the phenomenon in which the coating film thickened cold blast promptly after ventilation initiation was observed. After ventilating cold blast for 30 seconds, the coating film front face was continuously ventilated in 60-degree C warm air. The coating film was substantially dried by about 8-minute Hazama from warm air ventilation initiation, and the record sheet which prepared the ink absorption layer with a thickness of about 25 micrometers was obtained. The evaluation result of this sheet was shown in Table 1.

[0144]

[The example 2 of a comparison] The porous matter (I) dispersion liquid obtained in the example 13 of reference were heated at 60 degrees C, after adding the binder (j) obtained by this in the example 10 of reference at a rate used as the porous (matter I) / (Binder j) =100 / 25 (dry mass ratio), it mixed at 60 degrees C and coating liquid was created. After applying said 60-degree C coating liquid to the sheet made from polyethylene terephthalate (100 micrometers in thickness) which performed hydrophilization processing to the front face by the bar coating machine warmed at 60 degrees C, ventilation was promptly started for 10-degree C cold blast on the coating film front face. At this time, the coating film gelled cold blast promptly after ventilation initiation, and has held homogeneous thickness and a smooth front face. After ventilating cold blast for 1 minute, the coating film front face was ventilated in 60-degree C warm air. The coating film was substantially dried by about 8-minute Hazama from warm air ventilation initiation, and the record sheet which prepared the ink absorption layer with a thickness of about 25 micrometers was obtained. The evaluation result of this sheet was shown in Table 1.

[0145]

[The example 3 of a comparison] The binder (j) which heated the porous matter (I) dispersion liquid obtained in the example 13 of reference at 60 degrees C, and was obtained by this in the



example 10 of reference After adding at a rate used as the porous (matter I) / (Binder j) =100 / 25 (dry mass ratio), It added at a rate used as a dry type silica / polyvinyl alcohol =100/10, polyvinyl alcohol (Kuraray Make, Kuraray poval PVA235: trade name) was mixed at 60 degrees C, and coating liquid was created. After applying said 60-degree C coating liquid to the sheet made from polyethylene terephthalate (100 micrometers in thickness) which performed hydrophilization processing to the front face by the bar coating machine warmed at 60 degrees C, ventilation was promptly started for 10-degree C cold blast on the coating film front face. At this time, the coating film gelled cold blast promptly after ventilation initiation, and has held homogeneous thickness and a smooth front face. After ventilating cold blast for 1 minute, the coating film front face was ventilated in 60-degree C warm air. The coating film was substantially dried by about 8-minute Hazama from warm air ventilation initiation, and the record sheet which prepared the ink absorption layer with a thickness of about 25 micrometers was obtained. The evaluation result of this sheet was shown in Table 1.

[0146]

[The example 4 of a comparison] After adding to the porous matter (I) dispersion liquid obtained in the example 13 of reference so that it may be set to the porous (matter I) / cationic polymer =100 / 8 (dry mass ratio), they were made to distribute a cationic polymer (Asahi Denka Kogyo [ K.K. ] make polymer ADEKA thio ace DM-20A: trade name) 20 mass % water solution using an ultrasonic disperser. The binder (k) which heated these dispersion liquid at 60 degrees C, and was obtained by this in the example 11 of reference It adds at a rate used as the porous (matter I) / (Binder k) =100 / 25 (dry mass ratio). After mixing, the adipic-acid dihydrazide (ADH) 5 mass % water solution was mixed at 60 degrees C to this with a rate used as ADH/(Binder k) =2 / 100 (dry mass ratio), and coating liquid was created to it. After applying said 60-degree C coating liquid to the sheet made from polyethylene terephthalate (100 micrometers in thickness) which performed hydrophilization processing to the front face by the bar coating machine warmed at 60 degrees C, ventilation was promptly started for 10-degree C cold blast on the coating film front face. At this time, the coating film did not thicken cold blast, even after ventilating, but ununiformity-ization of the coating film called liquid Yori was observed. After ventilating cold blast for 1 minute, the coating film front face was continuously ventilated in 60-degree C warm air. It dried substantially by about 8-minute Hazama from warm air ventilation initiation, and the coating film obtained the record sheet of an ink absorption layer with an uneven thickness of about 10-15 micrometers. The evaluation result of this sheet was shown in Table 1.

[0147]

[Table 1]

	バインダー	微粒子 (C)	水溶性樹脂	冷却の 有無	乾燥時間 (分)	成膜性	透明性	塗工膜耐水性	インク吸収性
実施例 1	(a)	(I)	—	有	8	8	10	8	8
実施例 2	(b)	(I)	—	有	8	7	10	8	8
実施例 3	(c)	(I)	—	有	8	8	10	8	8
実施例 4	(d)	(I)	—	有	8	8	9	9	8
実施例 5	(e)	(I)	—	有	8	8	10	9	8
実施例 6	(f)	(I)	—	有	8	7	7	8	8
実施例 7	(g)	(I)	—	有	8	8	7	8	8
実施例 8	(h)	(I)	—	有	8	7	10	8	8
実施例 9	(i)	(I)	—	有	8	8	9	9	8
実施例 10	(i)	(I)	—	有	8	9	9	10	8
実施例 11	(i)	(I)	—	有	4	8	9	9	10
実施例 12	(i)	(II)	—	有	8	10	9	9	10
実施例 13	(i)	A300	—	有	8	8	8	9	8
実施例 14	(i)	(I)+A300	—	有	8	8	9	9	9
実施例 15	(i)	A300	—	有	20	8	10	9	8
実施例 16	(i)	A300	—	無	10	6	5	9	8
実施例 17	(a)	PS-S	—	有	8	7	8	8	6
比較例 1	—	(I)	PVA	有	8	2	5	5	5
比較例 2	(j)	(I)	—	有	8	5	10	8	8
比較例 3	(j)	(I)	PVA	有	8	6	10	7	5
比較例 4	(k)	(I)	—	有	8	1	1	測定不可	測定不可

バインダー (a) ~ (k) はそれぞれ参考例 1 ~ 11 で得られたバインダーに対応する。

微粒子 (C) : 表 2 参照

PVA : ポリビニルアルコール (株) クラレ製、クラレポパール PVA 235 : 商品名

[0148]

[Table 2]

無機微粒子	窒素吸着法		動的光散乱法		(SB-SL)
	細孔径 [nm]	比表面積 (SB) [m <sup>2</sup> /g]	数平均粒径 [nm]	換算比表面積 (SL) [nm]	
(I)	8	720	60	45	675
(II)	18	413	195	15	398
A300	18	290	98	28	262
PS-S	15	110	115	24	86

(I) : 参考例 13 で得られた多孔性物質

(II) : 参考例 14 で得られた多孔性物質

A300 : 乾式シリカ (日本アエロジル (株) アエロジル 300 : 商品名)

PS-S : コロイダルシリカ (日産化学工業 (株) PS-S : 商品名)

[0149]

[Effect of the Invention] The giant-molecule emulsion used for the record medium excellent in

ink absorptivity, membrane formation nature, surface gloss, and transparency, the coating liquid for record media, and this coating liquid by this invention, its manufacturing method approach, and the efficient manufacture approach of a record medium can also be acquired further.

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[Translation done.]